

**SEGMENTAL ASSIMILATION IN HAUSA NOMINAL AND VERBAL
REDUPLICATIVE MORPHOLOGY**

BY

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DEDICATION

I dedicate this thesis to my late father; Alhaji Ibrahim Mu'azu Gidan Kamba and my mother; Malama Nana Asma'u Adamu Gidan Kamba.

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ABSTRACT

Segmental assimilation, which affects features that are inherent in segments, is generally situated within the phonology-morphology interface across languages, including Hausa. Previous studies on Hausa reduplicative morphology have mainly focused on segmental phonological modification, with little attention paid to transparency and opacity in the context of assimilation. Thus, this study was designed to examine the contextual nature of segmental assimilation in Hausa reduplicated nouns and pluractional verbs, with a view to determining their domain, segments involved and features that trigger or block the process.

John Goldsmith's Autosegmental Phonology was adopted as the framework, while the descriptive design was employed. Three major cities in northern Nigeria (Sokoto, Kano and Katsina) were purposively selected as representative of the three core Hausa dialects. A paradigm of 20 reduplicative constructions were elicited from 45 purposively selected Hausa-literate native speakers; 15 from each dialect. This was complemented with natural conversation. The data was transcribed and subjected to morpho-phonological analysis.

Segmental assimilation in Hausa reduplicated nouns applies in the domain of adjacent obstruents ([**b, t, d, ɗ, k, ƙ, ɡ, s, z**]) and sonorants ([**n, m, r, l, w**]). Assimilatory processes in this context are either total or partial and they mostly occur in regressively with triggering features of place ([+lab], [+cor], [+pal]) and manner ([+cont], [+lat], [+nas]). This naturally results in the formation of morphosyntactic reduplicated nouns in the language: *díǵí:* → *díǵdíǵí:* → *díddíǵí* 'inquiry'; *múkè* → *múkmúkè* → *múmmúkè* 'jaw' and *dírà* → *dírdírà* → *díddírà* 'complicated diarrhea'. Assimilation also occurs in verb nominalisation to derive 'deverbalised' adjectives where non-palatal obstruent segments ([t, d, s, z]) synchronically become palatalised ([tʃ, dʒ]) as a result of the triggering effect of a suffixal vocalic feature ([+high]). In Hausa pluractional morpho-syntactic verbs, segmental assimilation occurs more in the domain of adjacent obstruents than sonorants and is usually triggered by the place (labial, coronal, dorsal) and manner (continuant) features. This process results in the formation of reduplicated verbs: *dákà* → *dákdàkà* → *dáddàkà* 'pound repeatedly'; *kámà* → *kámkàmà* → *kákkàmà* 'to catch repeatedly'; *dánnà* → *dándànnà* → *dáddànnà* 'to press repeatedly' and *mánna* → *mánmànnà* → *mámmànnà* 'to paste severally'. The occurrence of segmental assimilation in the context of Hausa reduplicated nouns and pluractional verbs, demonstrates feature-spreading. This situation is exhibited in the language via association with both source segments in the onset position of the reduplicant root-CVC and the target segments in the coda position of the reduplicated CVC. Segmental assimilation in reduplicative domain in Hausa admits off opacity without transparency.

Segmental assimilation in Hausa reduplicated nouns and pluractional verbs, is feature-driven, involving adjacency and opacity at the inter-morphemic boundary.

Keywords: Morpho-phonology in Hausa, Reduplicated nouns, Pluractional verbs, Segmental feature-spreading

Word count: 433

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LIST OF SIGNS AND ABBREVIATIONS

[]	phonetic representation/variant or output of a sound segment
//	phonemic representation/input element
=	equals to
()	optional bracket
→	becomes or changes as
/	in the environment of
—	position of a sound
±	plus or minus feature sign
⊥	feature delinking
	feature linking association line
⋮	feature spreading association line
ˈ	high tone mark
ˌ	low tone mark
˘	falling tone mark
AHT	all high tone pattern
ALT	all low tone pattern
AP	Autosegmental Phonology
ATR	Advanced Tongue Root feature
C	Consonant
V	Vowel
VV	Vowel length
VDA	Verb Derived Adjective
CV	Consonant-Vowel syllable
CVC	Consonant-Vowel-Consonant syllable
CVG	Consonant-Vowel-Glide syllable
cont	Continuant feature
cor	Coronal feature
dor	dorsal/velar feature
F	falling tone pattern
H	high tone pattern
HH	high-high tone pattern

HHH	high-high-high tone pattern
HHL	high-high-low tone pattern
HL	high-low tone pattern
HLH	high-low-high tone pattern
IHT	initial high tone pattern
ILT	initial low tone pattern
K	any velar consonant
L	low tone pattern
LL	low-low tone pattern
LH	low-high tone pattern
LLH	low-low-high tone pattern
LLL	low-low-low high tone pattern
Lab	labial feature
Nas	nasality feature
OCP	Obligatory Contour Principle
P	any bilabial consonant
PMH	Prosodic Morphology Hypothesis
PMA	Partial Manner Assimilation
PPA	Partial Place Assimilation
PV	Pluractional Verb
R	rhotic consonant [r]
RN	reduplicated noun
RV	reduplicated verb
Son	sonorant feature
SPE	Sound Pattern of English
T	any alveolar consonant
TBU	Tone Bearing Unit
TMA	Total Manner Assimilation
Trill	rhotic feature
voi	voice feature
WFC	Well-formedness Condition

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The phenomenon of reduplication as a morphological process is very common crosslinguistically. Similarly, issues that systematically relate to the interconnectivity of phonological and morphological processes are quite attested in many languages, particularly the ones that naturally occur within the reduplicative formation of words (see especially Wilbur 1973; McCarthy 1979; Marantz 1982). Reduplication is a common morphological process in the grammar of Hausa - a Chadic language that has many dialects distributed across the West African Sub-saharan region (Ahmad and Daura 1977). Hausa is very rich morphologically and its morphological system is often intertwined with phonological operations. This morphological and phonological interface attracted the attention of many scholars who worked on Hausa studies¹ for many decades (Gouffe 1975; Newman 2000). Although total reduplication exists in Hausa, there is no concrete evidence of attested phonological issues to be dealt with as a proof of phonology-morphology interplay in such reduplicative operation. Most of the phonological modifications in Hausa reduplication occur in partial reduplicative system which is often in the form of ‘prefixal reduplication’ - a type of partial reduplication common to many African languages (as opined by Marantz 1982).

Morphological processes like reduplication, affixation, compounding and clipping are generally attested in the Hausa language and are usually operated with accompanied phonological modifications in the derivational process of nominal and verbal morphosyntactic forms. However, among the said morphological operations, it is obvious that the system of Hausa reduplication accommodates more phonological modifications than any other morphological process in the language. The acclaimed phonological modifications attested in the reduplicative formation of those morphosyntactic forms appear in form of vowel shortening, segmental substitution and

¹ Those works were largely conducted by the non-native of Hausa language with few ones conducted by the real Hausa native scholars. For easy reference, most of the works are cited in Sergis, B (1977): Systematic Hausa Bibliography.

tonal adjustment. Most recurrently, it appears as an assimilatory modification that affects adjacent segments in the positions of partial reduplication (see Gouffe 1975 and Newman 1986). In most instances, reduplication that results in the formation of Hausa reduplicated nouns and pluractional verbs, exhibits a tendency of concurrent occurrence of both segmental assimilation and partial reduplication. This research, therefore, concentrated on the complexity of the featural distribution in the segmental assimilatory operations that are essentially specified by triggers that cause changes in the surface nominal and verbal reduplicated forms. This is mainly determined by the influence of segmental (both obstruents and sonorants) features in the domains of reduplicative operation, with clear possibilities of blocking and transparency effects.

1.2 Statement of the problem

The phenomenon of phonology-morphology interface, especially in the area of reduplication, has no doubt attracted the attention of many scholars who generally worked on Hausa grammar (see especially Skinner 1997; Amfani 2007; Newman 1986, 1989a and 2000; Jaggar 2001; Schuh and Yalwa 1993; Sani 2012). Most of these works were carried out in relation to morphological processes in Hausa with few ones (like Sani 2012; Schuh and Yelwa 1993; Newman 2000) that exceptionally dealt with phonological issues occurring in such processes. However, those works that considerably focused on phonological modifications in reduplicative formation of nouns and verbs in the language did not directly deal with them on the perspective of formal analytic descriptions that clearly spelt-out the nature and dimensions of segmental assimilation therein. Thus, there were not clear and adequate descriptive specifications in the previous studies on the extent of featural triggering effects on target segments involved in the assimilation within the domains of reduplicative operation. For instance, both Gouffe and Newman see assimilation in such contexts as mere segmental copying without really deepening the analysis to capture all details. Hence, the need for more studies to examine the segmental assimilatory possibilities in the target reduplicated morphosyntactic forms especially banking on the contemporary Hausa usage.

In the same vein, the previous models of analysis (descriptive and SPE-type linear generative frameworks) used in handling phonological modifications in the system of Hausa reduplication are fundamentally inadequate and revealed some analytic gaps in the literature. Moreover, the previous analyses advanced by scholars were

evidently with noticeable gaps with regard to detailed analysis of triggering effects and transparency of the affected segmental features in the contexts of assimilation. In order to address issues in relation to theoretical gap and provide better analytic explanations on such instances of phonology-morphology interface in Hausa reduplicative morphology, the current study considered the application of Autosegmental theoretic model in handling the analysis of, particularly, segmental assimilation in the reduplicative formation of Hausa ‘reduplicated nouns’ and ‘pluractional verbs’. This theory is reliably considered to be more adequate in the description of assimilatory occurrences in the reduplicative formation of the target morphosyntactic forms in the language.

1.3 Aim and objectives of the study

The main aim of this study is to examine the nature and dimensions of segmental assimilation occurring within the reduplicative formation of nominal and verbal morphosyntactic forms in Hausa. The following objectives are set to be achieved:

- i. to determine the extent of phonology-morphology interface in relation to segmental assimilation in the formation of nominal and verbal morphosyntactic reduplicated forms in Hausa using the mechanism of featural description.
- ii. to examine the nature of influence of adjacent segments involved in assimilation within the domain of reduplicative operations that result in the formation of morphosyntactic reduplicated nouns across the three core dialects of Hausa.
- iii. to examine the nature and influence of sequences of adjacent segments affected by assimilation within the domain of reduplicative operations that result in the formation of pluractional verbs across the three core Hausa dialects.
- iv. to identify the distribution of assimilatory features in the process of Hausa nominal and verbal reduplication for the purpose of ascertaining their categorization in terms of ‘triggers’, ‘pattern of feature-spreading’, ‘targets’ and ‘domain of operation’.

1.4 Research questions

Based on the identified objectices of this study, the following are the research questions:

- i. What is the extent of phonology-morphology interface in relation to segmental assimilation that occurs within the nominal and verbal morphosyntactic reduplicated forms in Hausa?
- ii. What is the nature of assimilatory influence in the sequences of adjacent segments involved in assimilation within the reduplicative domains that result in the formation of morphosyntactic reduplicated nouns across the three core dialects of Hausa?
- iii. What is the nature of assimilatory influence of the sequences of adjacent segments involved in assimilation within the domain of reduplicative operation that result in the formation of morphosyntactic pluractional verbs across the three core Hausa dialects?
- iv. How can assimilatory features be identified on the basis of their distribution in the process of nominal and verbal reduplication for the purpose of ascertaining their categorization in terms of ‘triggers’, ‘pattern of feature spreading’, ‘targets’ and domains of operation?

1.5 Significance of the study

The current research, which is based on the occurrences of segmental assimilation in reduplicative formation of Hausa nominal and verbal morphosyntactic forms, has immense significance considering its in-depth analytic dimension. As discovered in the relevant literature of Hausa grammar, the dominant scholarly research works are basically in line with traditional descriptive methods of analysis which to a large extent could not capture essential analytic details in the phonological operations that occur within the target reduplicative system. In view of this, the in-depth analysis of assimilation in terms of segmental feature classification and specification of their distribution in the domains of reduplicative operations would significantly add values to the existing literature of Hausa studies in general. Similarly, it would be significant to the researchers of Hausa phonology and morphology since the findings in this study revealed patterns of phonological changes, particularly those that pertain to segmental assimilation in the system of Hausa reduplicative morphology.

The insights of using Autosegmental theory in the analysis of assimilatory issues in the Hausa reduplicated nouns and pluractional verbs would significantly help in simplifying some complexities and unresolved issues in the previous analyses of phonological modifications in the system of Hausa reduplication. Moreover, it would

help students of linguistics, Hausa language experts and linguistic researchers who are into comparative studies in linguistics and language-related areas to make further discoveries on same phenomenon in relation to other processes in morphology and syntax of the Hausa language.

1.6 Delimitation of the study

This research covers the three major dialects of Hausa in Nigeria, namely: *Kananci* (located around Kano state); *Katsinanci* (located around Katsina state) and *Sakkwatananci* (located around Sokoto state). The main focus of the work is on the resultant effects of segmental assimilation in the processes of nominal and verbal reduplication in Hausa. As far as this research is concerned, the defining scope of the term ‘nominal’ comprises of noun and adjective reduplicative forms, and that of ‘verbal’, constitutes the verb reduplicative strings, mainly in form of pluractional verbs. Technically, the analysis in this research will be restricted to segmental assimilatory operations that underpin the formation of Hausa reduplicated nominal forms and pluractional verbs.

The main focus in this research, therefore, is actually on sequences of consonants that are affected by assimilation in nominal and verbal reduplicative formation and not the entire instances of phonological modifications therein. However, explanations of tone and vowel changes are incorporated in the data analytic discussions. On a general note, the work is limited to identifying segments involved in assimilatory operations within the domain of reduplication. These segments include sequences of obstruents, sequences of sonorants-obstruents (and vice versa), sequences of sonorants and sequences of consonants-vowels, all appearing in the adjacent positions of both reduplicated nouns (and also in deverbalised adjectives) as well as pluractional verbs in the language under study.

1.7 Hausa language and its sounds system

Hausa has a very long period of scholarly investigation concerning its linguistic classification, dialects and population of native speakers within Nigeria and beyond. According to Newman (2022), Hausa is universally coded and ascribed with: ISO No. (639-2); glottolog (haus1257) and placed in language sphere (19-haa-b). In his famous publication on classification of African languages, Greenberg (1963) declares that Hausa is classified as a member of the western sub-division of the Chadic branch of Afro-asiatic family of languages which is a sub-division of the African language family

comprised of approximately 350 languages. In another revelations, Newman (2000) and Caron (2013) affirmed that Hausa is one of the most spoken languages in Africa with approximately more than 40 million speakers on the continent and, at the same time, the range of its spoken usage spread throughout the west and central Africa. Based on the ranking by the Summer Institute of Languages (SIL, 2008), Hausa is ranked as the second most spoken language across Africa only after Swahili which is ranked first. The Chadic branch of Afroasiatic family mainly consists of languages found in northern Nigeria where Hausa is considered as the most populous and well-known language. It is also seen as the most important member of the branch because of its widespread. Although it is confirmed to have the greatest number of native speakers among Chadic languages, it is also used as a Lingua Franca by non-native speakers in various parts of West Africa, and as a common medium of communication for trade and commerce as well as education (especially traditional and religious). Similarly, being Nigeria a heterogeneous nation, the language is widely used as a tool of inter-ethnic communication especially among Muslims residing in the northern part of the country.

Apart from the core Hausa areas in northern Nigeria, the language is also spoken by Hausa communities in countries like Chad, Cameroun, Burkina Faso, Togo, Ghana and Sudan. In addition, just like many other African languages, Hausa is actually expanding to the extent that it is rapidly replacing minority languages spoken in the multi-ethnic areas. Although there are several languages that are well documented in Africa, Hausa is exceptionally one of the best documented and most extensively studied of all Sub-Saharan African languages. This is evidently proven considering the wide impact of the comprehensive and the most used reference grammars published in 2000 and 2001 by Paul Newman and Phillips Jaggar, respectively. It should equally be noted that long time ago, scholarly studies of the Hausa language began since early 19th century when Jakob Friedrichschars, a German missionary, published ‘a Grammar of the Hausa language’ in 1862.

1.7.1 Major Dialects of Hausa in Nigeria

According to Skinner (1997), the major dialects of Hausa in Nigeria cut across two geographical regions in the northern part of the country, namely; north-eastern region and north-western region. But its broader classification was offered by Ahmadu (1992) who provides a wider classification of Hausa dialects which constitutes Eastern,

Western and Northern dialects. According to him, Eastern Hausa dialects include *Kananci* (spoken in Kano), *Bausanci* (spoken in the areas of Bauchi), *Dauranci*, *Gudduranci* and *Hadejanci*; Western Hausa dialects are *Sakkwatanci* (spoken in Sokoto), *Katsinanci*² (spoken in Katsina), *Kutebanci*, *Arewanci* and *Kurhwanci*. The Northern Hausa Dialects are *Arewa* and *Arawa*. The locations and major places where Hausa is predominantly used as first language and those places where the language is in partial usage are depicted on the maps below:

²Although *Katsinanci* is classified among the western Hausa dialects, Katsina state is considered to be transitional between eastern and western dialects.



Fig: 1.1: Map of Major Hausa Dialects in Nigeria and Niger Republic
 (Culled from researchgate.com)

The green shaded parts in Figure 1.1, portray the areas of predominant Hausa usage and where the core Hausa dialects are located in both Nigeria and Niger Republic. In most cases, there are certain levels of overlaps in the dialect use in Sokoto and those in the neighbouring parts of Niger Republic. However, despite this regional disparity in the use of these dialects within and outside Nigeria, any speaker of the language can understand any other speaker of the same language but with relative differentiation in pronunciation, vocabularies and semantic contents. In the same perspective, Ahmad and Daura (1970) pointed out that despite the established regional variations being attested in respect of Hausa, the dialects were standardized in which case Kano dialect is considered as the standard Hausa but with an obvious reflection of features from other dialects.



Fig. 1.2: Map of Major Hausa Dialects in Nigeria
 (Culled from najahom.com)

As indicated in the map in Figure 1.2, the blue shaded parts are the only states or places where Hausa is predominantly used as a dominant language in those communities. It is also used as Lingua Franca in speech communities where there are additional minority languages in use. These dialects in Nigerian context, even though sparsely distributed, they are, however, standardized. This issue of standardization of Hausa dialects was severally discussed in the works of other prominent scholars in the area of Hausa studies who conducted extensive researches on issues pertaining to Hausa dialects (across the geographical regions in Nigeria) and its social speech variability (refer to Leben 1996; Schuh and Yalwa 1993; Caron 2013; Newman 2000 and Jaggar 2001 for detailed discussions on this).

1.7.2 Inventory of Hausa consonant sounds

Based on scholarly findings (Schuh and Yalwa 1993; Sani 1989, 2012 and Newman 2000), Hausa language operates with approximately 33 phonetic and phonemic consonants, albeit, some of the phonetic consonants are traditionally misconstrued as phonemes in the language. Consider the following consonants in **1a** and **1b**:

1. a. Phonemic: /ʔ/, /b/, /ɓ/, /t/, /d/, /ɗ/, /k/, /k̄/, /g/, /ɸ/, /s/, /z/, /ʃ/, /tʃ/, /ɗʒ/, /sʰ/,
/h/, /l/, /r/, /r̄/, /m/, /n/, /w/, /j/

b. Phonetic: [k^w], [k̄^w], [k^j], [k̄^j], [g^w], [g^j] and [ɸ^j], [ɺ], [ɺ]

The 24 phonemic consonants occur initially in the following words:

<i>Sounds</i>	<i>Transcription</i>	<i>Orthography</i>	<i>Gloss</i>
/ʔ/	/ʔáikì:/	aiki	‘work’
	/ʔígíjà:/	igiya	‘rope’
/b/	/bá:wà:/	bawa	‘slave’
	/bí:tà/	bita	‘revision’
/ɓ/	/ɓé:rà:/	ɓera	‘rat’
	/ɓátà:/	ɓata	‘lost’
/t/	/tá:kì:/	taki	‘fertilizer’
	/tárkò:/	tarko	‘trap’
/ɗ/	/ɗá:wà:/	dawa	‘guinea corn’
	/ɗó:jà/	doya	‘yam’
/ɗ/	/ɗá:kì:/	ɗaki	‘room’
	/ɗájá:/	ɗaya	‘one’
/k/	/kúɗí:/	kudí	‘money’
	/kí:ɸí:/	kifi	‘fish’
/k̄/	/k̄árɸí/	k̄arfi	‘strength’
	/k̄irdzì:/	k̄irji	‘chest’
/g/	/gá:fî:/	gashi	‘hair’
	/gé:mù/	gemu	‘beard’
/ɸ/	/ɸítsárí:/	fitsari	‘urine’
	/ɸárí:/	fari	‘white’
/s/	/sá:bó:/	sabo	‘new’
	/sá:tà:/	sata	‘theft’

/z/	/zá:kì:/	zaki	‘lion’
	/zá:ǫí:/	zafi	‘heat’
/ʃ/	/ʃá:ǫì:/	shafi	‘page’
	/ʃírú:/	shiru	‘silence’
/tʃ/	/tʃârbí:/	carbi	‘string of beads for prayer’
	/tʃû:tá:/	cuta	‘disease’
/ɖʒ/	/ɖʒà:kí:/	jaki	‘donkey’
	/ɖʒìkí:/	jiki	‘(human) body’
/ts/	/tsá:nì:/	tsani	‘ladder’
	/tsì:ní:/	tsini	‘sharp (object)’
/h/	/hánǧî:/	hanci	‘nose’
	/hù:lá/	hula	‘cap’
/l/	/lámbà:/	lamba	‘number’
	/líkítà:/	likita	‘doctor’
/r/	/rá:ná:/	rana	‘sun’
	/rúwá:/	ruwa	‘water’
/r̄/	/bâŕà:/	bara	‘begging’
	/r̄áhà/	raha	‘chatting’
/m/	/mà:tá:/	mata	‘wife’
	/míjà:/	miya	‘soup’
/n/	/ná:mà:/	nama	‘meat’
	/né:rà:/	nera	‘Naira’
/w/	wà:sá:/	wasa	‘play/game’
	/wújà:/	wuya	‘neck’
/j/	/já:rò:/	yaro	‘boy’
	/júnwà:/	yunwa	‘hungry’
/z/	/zá:kì:/	zaki	‘lion’
	/zúgà/	zuga	‘to incite’

The consonants in 2 are the core Hausa phonemes based on the nature of their distribution since they contrastively operate with all the vowel phonemes in the language. This idea is supported by Schuh and Yalwa (1999), even though their position was based on research on the phonetics of Hausa sounds by Carnocha (1952). The table below shows both phonetic and phonemic consonants of Hausa:

Table 1.1 Hausa phonetic and phonemic consonant chart

		Bilabial (pal.)	Alveolar	Post- Alveolar	Palatal	Velar			Glottal	
						Plain	Palatalized	Labialized	Plain	Palatalized
STOP S	Nasals	m	n		[ɲ]	[ŋ]				
	Plosives	b	t d			k g	[kʲ] [gʲ]	[kʷ] [gʷ]	ʔ	[ʔʲ]
	Implosives	ɓ	ɗ							
	Ejectives			ts		ɕ	[kʲ]	[kʷ]		
FRICATIVES		ɸ(ɸʲ)	s z		ʃ				h	
AFFRICATES				tʃ dʒ						
TRILL			r							
ROLL			ʀ							
LATERAL			l							
APPROXIMANTS		w			j					

Adopted from Sani (2012)

A closer look at the consonant chart in table 1.1 reveals that the chart is a representation of both phonetic and phonemic consonants where the phonemic segments are enclosed in square brackets. In the literature of Hausa phonetics and phonology, the issue that generally attracts scholars' attention is the phonemic status of / ϕ / and its distribution in the system. This sound has [h], [ϕ] and [p] as its free variants, depending, to a large extent, on the dialect/idiolect and phonological environment (see Newman 2000 and Jaggar 2001 for details on this issue). Similarly, the palatalised nasal ([η]) and velar nasal ([ŋ]) are equally predictable in respect of their phonological occurrence. The palatalised nasal consistently occurs before palatal sounds, whereas the velar nasal occurs in monosyllabic coda position (Lindau (1984); Lindsey Hayward and Haruna (1992); Newman (2000)). Newman (2000) further confirmed that /m/ exhibits similar tendency with /n/ in the sense that it also changes to [η] in the final position, especially in some contexts where forms are bisyllabic and the second coda sound is [m]. Consider the three possibilities shown in the following examples:

2. a. i. jín.jà → jí η .jà 'taking care of a sick person'
- ii. fán.jà → fá η .jà 'spreading something to dry'
- b. i. tǎn → tǎ η 'there'
- ii. kán → ká η 'on (top of)'
- c. i. má:lám(má:lámí:) → mala η 'teacher'
- ii. lì:máám (lì:má:mi) → lì:máá η 'imam'

Note: 2c is extracted from Newman (2000, p. 394)

Thus, the forms in example 2c (i and ii), arguably show that /m/ is equally realized as [η] in the final position.

1.7.3 Inventory of Hausa vowel sounds

The viewpoint on the exact number of vowels in the phonological system of Hausa has not generated much debate in the literature of Hausa grammar since scholars unanimously agree that the language operates with twelve vowels which equally function contrastively (Newman 2000; Jaggar 2001; Amfani 2007 and Skinner 2009). Ten out of these vowels are monophthongal in nature; also known as plain or pure vowels (with five long and five short), and the remaining two are diphthongs ([ai] and [au]), which simply refers to sounds which consist of movement or glide from one vowel to another (Ramlatu, 2012). Although Lindau-Webb (1985), Newman (2000) and Caron (2013) posited two diphthongs in the Standard Hausa, scholars like

Smirnova (1982), Carnochan (1951), Schur (2003) suggest that, based on dialectal variations, Hausa operates with four (4) diphthongs, namely; [ai], [ei], [oi] and [au]³.

Similarly, vowel length is attested in the monophthongs of Hausa where phonemic distinction is always made between short and long vowels. This simply means the status of vowel length or vowel quantity is phonemic in the language. The representation of length is indicated by double dots after the vowel sound; a macron on the vowel sound, and sometimes, the sound is left unmarked (Amfani 2007; Bello 1999 and Skinner 2009). The ten monophthong vowels and two diphthongs are listed in 3 below, along with the forms where they occur contrastively:

3. i. Monophthongs (short)

<i>Sound</i>	<i>Transcription</i>	<i>Orthography</i>	<i>Gloss</i>
/a/	ɸáɗà:	faɗa	‘fight’
/ɪ/	gíjà:	giya	‘alcohol’
/o/	g ^w àdó	gwado	‘hand-woven blanket’
/u/	kùná:mà:	kunama	‘scorpion’
/e/	rágè	rage	‘to reduce’

ii. Monophthongs (long)

<i>Sound</i>	<i>Transcription</i>	<i>Orthography</i>	<i>Gloss</i>
/a:/	ɗá:kì:	ɗaki	‘room’
/ɪ:/	bí:tà	bita	‘revision’
/o:/	kó:tù	kotu	‘court’
/u:/	tú:bá:	tuba	‘repentance’
/e:/	tè:kú	teku	‘sea/ocean’

iii. Diphthongs

<i>Sound</i>	<i>Transcription</i>	<i>Orthography</i>	<i>Gloss</i>
/aɪ/	?áíkì	aiki	‘work’
/au/	bàùtá:	bauta	‘worship/slavery’

As can be seen in the foregoing discussion on vowel sounds in Hausa, the representation of length or duration in vowels is shown in the tables below (1.2a and 1.2b):

³ Some scholars of Hausa studies argue that in addition to [ai] and [au] diphthongs Hausa has [iu] and [ui] as diphthongs (see Sani 2012 for details on their position).

Table 1.2a: Hausa monophthongs⁴ (short and long)

	Front	Central	Back
High	i i:		u u:
Mid	e e:		o o:
Low		a a:	

Adopted from: *The Language Gulper; Hausa* (2013)

⁴ In addition to the position of many scholars of Hausa language (Newman 2000, Sani 2012 and Caron 2013) on the representation of Hausa vowel length, an online publication (AWL, 2015) reveals that length in the Hausa monophthongs is indicated with a macron on the vowel sounds.

Monophthongs of Hausa are shown in Table 1.2a. As shown in the table, the long and short vowels occupy the five canonical vowel positions. Each of these positions indicates the actual mobility of tongue, which in turn marks the differences in quality and duration between the vowels. One of such differences is that the long vowels are consistently longer in duration than their short counterparts. In addition, vowel length functions lexically in a position other than final, and in medial position, the vowel length is generally stable; not subject to morphological alternations (see Parsons (1970) and Newman (1979b) for details on Hausa vowel system).

Table 1.2b: Hausa monophthongs (short and long)

	Front	Central	Back
Close	i ī		u ū
Close-Mid	e ē		o ō
Open		a ā	

Adopted from *about world languages (awl): Hausa* (2015)

It is very obvious that the monophthongal vowels in table 1.2b look quite similar to those in table 1.2a, only that they are represented in a different way. As shown in the table, the type of vowel length distinction is not noted in the standard Hausa orthography, despite the fact that long vowels generally have typical universal phonetic values. Newman (2000) affirms that the length contrast is only found in open syllables, but in closed syllables all vowels are naturally short. One other important thing about the Hausa vowels is that they generally carry the tone; or are referred to what Goldsmith (1976) and Yip (2002) termed ‘tone bearing units’ (TBUs), as attested in the examples 2, 3 and 4.

1.7.4 Basic tone system of Hausa

Being one of the Chadic languages, Hausa uses tone to create contrast at both lexical and grammatical levels. It is a discrete tone system in which, as affirmed by Newman (1996), its tonal system appears quite simple, compared with languages of Coastal West Africa or Southeast Asia. Despite its relative simplicity, however, Newman (1996) further asserts that its surface appearance marks a range of complexities. On the issue of contrastive potential of tone in Hausa, Amfani (2007, p. 136) affirms that the language uses different pitch levels to distinguish words which are otherwise similar orthographically as shown in the data below:

4. i. a. wá:rí: ‘bad odour’
 b. wá:rì: ‘one of pair (of shoe)’
 c. wà:rí: ‘age mate’
- ii. a. sú:má: ‘fainting’
 b. sù:má: ‘hair on man’s head’
- iii. a. dàrá: ‘red cap’
 b. dára: ‘a type of game’

Hausa operate a discrete tone system and all its syllables are tone-bearing units. These are often associated with two surface level tones (High and Low) and a contour type, basically in form of falling tone which is generally claimed to be as a result of underlying derivation from a combination of High and Low tones (Caron 2013 and Newman 1996, 2000). This assumption is grounded in the literature of Hausa grammar from the early works of Abraham (1941), Greenberg (1941) and Hodge and House (1944). Accordingly, Matthews (1997) posits a description which postulates that falling tone is such that the pitch level of the tone falls from relatively high to relatively low.

Based on the foregoing description of Hausa tone system and, in line with the universal convention of tone-marking, the High tone is marked with an acute accent ([á]), the Low tone is marked with a grave accent ([à]) and the Falling tone is marked with a circumflex accent ([â]). Although both High and Low tones are represented in the example 5 as lexically contrastive, Falling tone may equally be lexically contrastive but in a very restricted instances since it has only limited occurrences in Hausa (Newman 2000). This is shown in the example below:

5. a. mâi(F) ‘oil’
 mài (L) ‘owner of’
 b. kâi(F) ‘head of human’
 kái(H) ‘you’

Despite the lexical contrast of falling tones as indicated in the forms in 5, Newman (1996) affirms that in describing the Hausa falling tone, there exist several reasons for treating the said contour tone as HL on a single syllable:

- Falling tones only occur on heavy (bimoraic) syllables
- In phonologically shortened words, an original Low tone combined with a High, produces a Falling tone.
- The grounding of floating low tones, which are associated with certain morphemes, produces a Falling tone.

It should be noted that the position of many scholars of Hausa is that the language does not operate with ‘Rising’ tone. Therefore, any occurrence of low-high combination on a single syllable through deletion or contraction in morphological process, either diachronically or synchronically deletion or contraction in morphological processes, is simplified to a high or a low tone pattern, depending on the context of its occurrence (Newman 2000; Crysmann 2003 and Caron 2013). Consider the forms in the following example, extracted from Newman (2000):

6. i. gáwàjí (gawayi) → gáwàì ‘charcoal’
 ii. ká jì (ka yi) → kâi ‘do it (command)’

Although the phenomenon of contour tone in Hausa attracted a lot of scholarly views, the dominant view held by scholars is that falling tone is analyzable as a diachronic combination of high and low tones appearing on a single heavy syllable (see Leben 1973 for details on this).

1.7.5 The Hausa syllable structure

In Linguistics generally, even though the term ‘syllable’ is intuitively recognised by native speakers, the concept remains very complex to define in the literature. However, it is traditionally defined as the minimal unit of speech pronunciation. In respect of this, Skinner (1997) posits that “it is the smallest piece of speech that is easy to say”. Similarly, syllable as a phonological concept is seen as a basic unit of speech production and perception generally consisting of a segment of greatest acoustic energy that is usually described as a unit of speech consisting of an onset and/or a rhyme, where ‘rhyme’ constitutes the nucleus and coda (Elugbe 2000, Ladefoged 2001 and Small 2005). In the same vein, Abercrombie (1975) sees a syllable “as the unit of pronunciation being the smallest stretch of sound that can be uttered with one breath”.

Within the syllable sub-constituents, ‘coda’ is a consonant that arrests or closes a syllable in some languages, while a nucleus is the peak of a syllable which is mostly in form of vowel segment but it could sometimes be consonantal in nature. Any consonant that is syllabic must also serve as the nucleus of a syllable while it maintains its level of sonority. Few instances of syllabic consonants exist in Hausa, where a syllabic alveolar nasal serves as the vocalic nucleus in place of a vowel; examples of this kind of syllabification are cited in Newman (2000, p. 403), where it is shown to be a phonological process that generally simplifies the production of syllable, creating, for instance, a consonant-vowel (CV) or a consonant-vowel-consonant (CVC) pattern⁵. Structurally, the distribution of monophthongs (long and short) and diphthongs in Hausa is such that they only occur in open syllables. Conversely, only short vowels occur in close syllables, although some phoneticians argue that short vowels that occur in close syllables are phonetically longer than in open syllables when followed by a sonorous consonant (Catford, 2001; Crystal, 2003; Ladefoged, 2005 and Ladefoged, 2006). Simply put, this kind of difference is usually attributed to the influence of voicing on vowels; vowels in the nucleus position are realized with shorter duration before a voiceless obstruent. Both typologically and structurally, syllables in Hausa are basically classified into three categories based on the positions of Skinner (1997) and Newman (2000), namely; CV, CVV and CVC. These types are exemplified below:

⁵It is important to point out here that syllables are universally marked or indicated by a Greek letter ‘sigma’ (σ) to show the pattern of their division.

7. i. CV - **tá**.rà: (tara) ‘nine’
 ii. CVV - **táá**.kì: (taki) ‘fertilizer’,
 káí.fí: (kaifi) ‘sharpness’
 iii. CVC - **φús**.kà (fuska) ‘face’

Considering the syllable types in 7, it is clear that a CV-type syllable is made up of a consonantal onset with a nucleus consisting of a short vowel (7i.). Also, a CVV-type syllable is made up of a consonantal onset with a long nucleus consisting of either long monophthongal vowel or a diphthong (as shown in 7ii.). Typically, a CVC-type syllable consists of an onset consonant plus a short vowel nucleus and another consonant in the coda position. The most fundamental thing here is the issue of ‘length’, which is most often described as the phonological correlate of durational differences between sounds; tied to the phonological concept ‘quantity’. Duration of this nature is usually considered in form of segmental units (consonants and vowels); although in Hausa length is only phonemic in relation to vowels. Specifically, vowel length contrast in Hausa is manifested qualitatively as well as quantitatively, where long vowels are longer and tense, and short vowels are shorter, lax and more centralized. This phonemic distinction of vowel length in Hausa is quite similar to what Chomsky and Halle (1968) consider as tense/lax opposition. It should be noted that there are a lot of scholarly debates in the literature of Hausa grammar about the position of syllables in Hausa that begin with a vowel sound⁶.

1.7.5.1 Structure of light syllable in Hausa

This section examines the nature of Hausa syllable structure with respect to its lightness, taking into consideration the issue of mora (a unit of syllable weight). Etymologically, the term ‘mora’ is sourced from Latin, which means ‘a short period of time’ or ‘delay’. Technically, however, a ‘mora’ is defined as a function of syllable’s number of weight-bearing units (Kager, 1999). Both heavy and light syllables are attested in the Hausa language, especially in open syllables; close syllables in Hausa are naturally heavy even if they contain single moraic vowel (Newman, 2000). As previously pointed out in the sections on the nature of Hausa syllable structure, CV syllables are universally light and therefore monomoraic in nature. Differently put,

⁶The main position of most Hausa scholars in the literature is that vowel must not be an onset of a syllable in the language, which simply means, even if a word or syllable appears orthographically with an initial vowel, it is phonemically with an initial glottal stop [ʔ]. However, this research is not going enter into that controversy.

syllables that are of CV-types in Hausa, despite their lightness, are described as having a single weight unit (mora). Forms that are of CV-types in the Hausa language are cited in the following examples:

8. i. CV - **mú** (mu) 'we'
- ii. CV - **ní** (ni) 'I'
- iii. CV - **dà** (da) 'and'

Words that are of CV-type syllable are not very common in the Hausa language, with the exception of independent personal pronouns because they are the most commonly cited in the literature (see Newman 2000). Most of the words with bi- or polymoraic syllables contain simple monomoraic syllables within them. As can be observed in 8, particularly 8i and 8ii are subjective pronouns (8i is singular and 8ii is plural), whereas the one in 8iii is a conjunction. For more on light/monomoraic syllables in Hausa, see Newman (1979; 2000, p. 407), Schuh (2003, p. 42) and Skinner (1997, p. 22).

1.7.5.2 Structure of heavy syllable in Hausa

Syllables that are associated with heaviness often appear in form of CVV and are very common cross-linguistically. These types of syllables are generally characterised by durational quantity which makes them bimoraic. In bimoraic syllables, the nucleus is not the only important sub-syllabic constituent that determines the structure of the syllable but, sometimes, the following consonant (coda). A syllable that has coda constituent is referred to as CVC-type syllable, and its weight depends largely on whether or not its coda consonant is moraic. It should be noted that despite the fact that 'onset', 'nucleus' and 'coda' are universally considered as the sub-syllabic constituents, weight usually refers to coda consonants not the onset consonants.

Heavy syllables are widely attested in the phonological system of Hausa. The CVV-type and CVC-type in Hausa are the only syllable attributed to heaviness that clearly indicates a bimoraic weight (Sani 1989). Although the general position in the conception of bimoraic nature of CVV syllable is never contentious, the status of CVC moraic quantity in Hausa attracted a lot of scholarly views. For instance, on the issue of moraic status of CVC, Skinner (1997) asserts that the consonants that most often occur at the coda position are mostly mora consonants that are equally capable of carrying tone (tone-bearing units). This class of consonants usually exhibits natural tendency of sonority. However, if any non-sonorant consonant occupies such coda position, it must be phonetically similar with the consonant that initiates the syllable that immediately

follows. In a contrary position, Newman (2000) observes that it is not possible to have a bimoraic syllable with CVVC structure in Hausa. According to him, such over-heavy syllable automatically results to nucleus reduction in which the second component of the complex nucleus is deleted at the surface level. Syllables in Hausa that are both quantitatively and qualitatively bimoraic are cited in the example below:

- | | | | | |
|----|------|---------------------------------|----------|-------------|
| 9. | i. | CVV - ɗʒũ | (ji) | ‘hearing’ |
| | ii. | CVV - sóò | (so) | ‘love’ |
| | iii. | CVV - râi | (rai) | ‘life/soul’ |
| | iv. | CVV - kâi | (kai) | ‘head’ |
| | v. | CVC - k^wál.ba | (kwalba) | ‘bottle’ |
| | vi. | CVC - tár.ko | (tarko) | ‘trap’ |

The syllable types in 9 show three possible patterns of heavy (bimoraic) syllable in Hausa. Notably, the nature of mora in 9i-ii is obviously that of quantity, while the one in 9iii-vi is actually based on the quality of the nucleus alone (9iii-iv) as well as that of the nucleus and sonorant coda (9v-vi). It should be noted that in this kind of situation, what is important is the number of morae in each of the syllables cited in 9.

1.8 An overview of Hausa ‘verb grade’ system

Understanding the Hausa ‘verb grade system’ is crucially relevant to the current study since part of the research dwells on phonology-morphology interface in Hausa verbal reduplication with specific focus on segmental assimilation. In the literature of Hausa grammar, the description of verbs is usually in terms of the way they are classified in ‘grade system’, and the term ‘grades’ or ‘grade system’ were first suggested by Parsons (1960)⁷. Central to the description of Hausa verbal system by Parsons (1960) is an indication that regular verbs in Hausa are organized into seven grades⁸, which are variously described on the basis of tone pattern and final vowel. Generally, as Wolff (1984) argues from diachronic evidence, all Hausa verbs must belong to a specific vowel class depending on the quality of the final vowel of their basic form - although the diachronic distinction may no longer be apparent in the synchronic system. Sometimes, the verb form may have a final consonant ending (as in

⁷ F.W Parsons is the most influential scholar of the Hausa Language in the 20th Century, and he first developed a classification of verb forms in Hausa language (in 1960). His system of Hausa ‘verb grade’ has become the frame of reference for all Hausa scholars.

⁸ Grade 0 verb is exceptionally not part of Parsons’s classification. Newman (1973) categorized them as grade 0 verbs with their common attribute of one root consonant; mono-consonantal verbs. They include verbs like: [yi] ‘do’; [bi] ‘follow’; [kai] ‘reach’.

the case of verb grade 5 shown in table (1.3e) below). Thus, verbs that belong to grade 5 usually have a final consonant [-r] and they are followed by a particle (**da**) when preceding a direct object.

Parson's (1960) description of verb grade system further captured the definition of four syntactic forms, namely; *A- Form, B- Form, C- Form and D- Form*. According to him, A-form is the citation form and is often considered as the basic form of both transitive verbs (where no object directly follows the verb) and of intransitive verbs (where an object must follow the verb). Most importantly, it is also the form from which other forms are derived. Moreover, apart from the A-Form verbs, the description of verb forms B, C and D is summarized below:

- i. The B-form precedes a pronoun direct object.
- ii. The C-form precedes a noun direct object, and
- iii. The D-form precedes an indirect object (pronoun or noun); some intransitive forms also have D-form.

This is primarily a classification of verbs according to their forms, but the grade forms relate to aspects of meaning as well. Traditionally, there are seven grades, each with a distinctive combination of tone patterns and final vowels. These grades can be presented according to their forms using the 3rd masculine singular completive pronoun [já:] (ya). The categorization of 'grade system' forms is shown in tabular form, where illustrative objects are represented using the 3rd feminine singular pronoun [tà] (ta) to represent any pronoun direct object. Similarly, the woman's proper name (Binta) in the representations is used to represent any noun object and the 3rd feminine singular indirect object pronoun [mátà] (mata) to represent any indirect (pronoun or noun) object. Consider the tables that follow which show the categorization of verbs according to their respective grades and syntactic forms as adapted from Newman (2000).

The tables below (1.3a – 1.3g) show categorization of Hausa verbs into groups, technically known as 'grades'. In addition, they can as well be classified according to syntactic forms as shown in the tables. As can be observed, the verbs that appear in the tables demonstrate the morpho-syntactic forms of verbs in Hausa. This is very obvious in table (1.3b) where the length and tone of the final vowel [-a] in verb Grade 2, depend largely on object type. In the same way, grade 3 verbs are all intransitive in nature, and as such never have either direct or indirect object following them. Comparatively, verbs in grade 4 have similar patterns of distribution with those in grade 2 since the tone and

length of the final [-e] vowel depend largely on the type of object which follows them. But the final vowel of grade 4 verbs, according to Newman (1973) can be pronounced with duration before a noun object. Consider the tabular representations of these verb grades below:

Table 1.3a Grade 1: IHT (on 1st syllable) and final [-a]

<i>No object</i>	<i>Pronoun Dir Obj</i>	<i>Noun Direct object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: dáfà:	yá: dáfà: tá	yá: dáfà wá:ké:	yá: dáfà: mátà	‘cook’
yá: gírmàmá:	yá: gírmàmá: tá	yá: gírmàmà Bíntà	yá: gírmàmá mátà	‘honour’

As shown in table 1.3a, verbs in grade 1 are usually transitive in nature and they appear in form of bi- or trisyllabic forms which have the [a] final vowel that consistently bears a low tone. Similarly, verb forms in this grade are always in form of initial high tone pattern (IHT) which specify that the nature of the tone pattern of bisyllabic verb forms grade I is HL and that of the trisyllabic form is HLL.

Table 1.3b Grade 2: ILT (on 1st syllable) and final vowel depends on object type

<i>No object</i>	<i>Pronoun Dir obj</i>	<i>Noun Direct object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: àurá:	yá: ?àuré: tà	yá: ?àurí Bíntà	(optional)	‘marry’
yá: tàmáyà:	yá: tàmàyé: tà	yá: tàmàyí Bíntà	(optional)	‘ask’

The type of verb forms in table 1.3b, is the Hausa verb grade 2 that have different morphosyntactic unique characteristics. It can appear without object in a given construction as indicated in the table. It can as well take a pronominal object or a noun object, and in most cases, it even takes an indirect object. In all these possibilities, the final vowel of the verb form varies according to the nature of the object that follows it. Similarly, as shown in the table, if the form is a bisyllabic or try syllabic verb, it must have an initial low tone.

Table 1.3c Grade 3: ILT (on 1st syllable) and final vowel [-a] (all intransitives)

<i>No object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: fitá	(optional)	‘go out’
yá: hàkùrà	(optional)	‘be patient’

As shown in table 1.3c, the nature of grade 3 verbs in Hausa is considerably different from those in grades 1 and 2 cited previously. In this case, the verb form (whether bi- or trisyllabic) consistently has an initial low tone pattern and does not require a direct object, but the indirect object may occur optionally, depending on the context.

Table 1.3d Grade 4: IHT (on 1st syllable) and final vowel [-e]

<i>No object</i>	<i>Pronoun Dir obj</i>	<i>Noun Direct object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: kʷá:lè	yá: kʷá:lè tá	yá: kʷálè Bíntà	yá: kʷálè mātà	‘ignore’
yá: ádʒiyé:	yá: ádʒiyé: tá	yá: ádʒiyè Bíntà	yá: ádʒiyé: mātà	‘put away’

The verbs in grade 4, as shown in table 1.3d, have consistent tone patterns of initial H and final L tones. They are both intransitive and transitive in nature and, in the case of the transitive types, the objects they take are in different forms. It could be in form of pronoun, noun and indirect object as well.

Table 1.3e Grade 5: AHT (on each syll) with final [-ar]; with alternate terminations

<i>No object</i>	<i>Pronoun Dir obj</i>	<i>Noun Direct object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: fítár	yá: fítár dà ?ítá yá: fíddà ?ítá yá: físshé: tà	yá: fítár dà Bíntà yá: fíddà Bíntà	yá: fítár mátà	‘remove’
yá: wáhálár	yá: wáhálár dà ?ítá yá: wáhál dà ?ítá yá: wáhálshé: tà	yá: wáhálár dà Bíntà yá: wáhál dà Bíntà	yá: wáhálár mátà	‘trouble’

The table in 1.3e, demonstrates the class of Hausa verbs in grade 5. Verbs in this grade have some peculiar attributes, compared with those in the preceding grades. They consistently have a HH or HHH tone pattern. Considering the illustrative verbs in table 3.1e, it is certainly obvious that all grade 5 verbs have a ‘long’ form ending in [-**ar**] as shown in the first line. Also, many grade 5 verbs have a ‘short’ form formed by dropping the [-**ar**] ending, as shown in the second line, and in both ‘long’ and ‘short’ forms, the preposition [**da**] is required before the object (see Parsons (1960) and Newman (1973) for detailed description of Grade 5 verb forms in Hausa).

Table 1.3f: Grade 6; AHT (on each syllable) and final vowel [-o:]

<i>No object</i>	<i>Pronoun Dir obj</i>	<i>Noun Direct object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: ká:wó:	yá: ká:wó: tà	yá: ká:wó: Bíntà	yá: ká:wó: mátà	‘bring’
yá: támbáyó:	yá: támbáyó: tà	yá: támbáyó: Bíntà	yá: támbáyó: mátà	‘ask&come ,’

Verb forms in grade 6, as shown in table 1.3f, also demonstrate some characteristic difference compared with those verb forms in the previously cited grades. Looking at the presentation in table 1.3f, it is certainly clear that grade 6 verbs form the most regular of all grades. In essence, any verb root can be formed a grade 6 verb and the meaning remains absolutely predictable, and by virtue of their nature, verbs in this grade are classified as *ventive* (derive from Latin **venire** ‘to come’), and as such reflect the usual characterization of grade 6 verbs as ‘action towards the speaker’.

Table 1.3g Grade 7: LHT pattern and final [-u] (All intransitives)

<i>No object</i>	<i>Indirect object</i>	<i>Gloss</i>
yá: kà:ru	(optional)	'benefit/be improved'
yá: tàmbàyu	(optional)	'(someone who is) well asked'

As shown in table 1.3g, grade 7 verbs are morpho-syntactically similar to those in grade 3. This is so because based on the representation of the said verbs, they tend to have no distinctive pre-indirect object form which naturally makes it practically uncommon to use them with direct or indirect objects.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter reviewed aspects of literature that are relevant to this study particularly those that relate systematically to issues that pertain to the nature and extent of phonology-morphology interconnectivity, with specific focus on segmental assimilation⁹ in Hausa nominal and verbal reduplicative morphology. It therefore focused on assimilatory operations and reduplicative formation of basic morphosyntactic forms with specific reference to the Hausa language. In furtherance, previous studies on phonological modifications in reduplicative formation of Hausa reduplicated nouns and pluractional verbs were critically reviewed.

2.2 An overview of phonology-morphology interface

The interplay between phonology and morphology, as posited by Paster (2006), is a phenomenon that has attracted the attention of many scholars in the field of modern linguistics. From the early 90s, there has been a push towards the study of phonological effects on morphology especially phonological conditions on morphological processes (such as reduplication, affixation and compounding) which is the main area of focus in this study. Although the study of phonology-morphology interface has relatively old roots in the theoretical literature, particularly in the formal analysis of ‘morphologically conditioned phonology’ (see especially Kiparsky (1982) and Mohanan (1986) for details on these types conditioning), this research area received little attention from scholars in the past few decades, with notable exceptions such as Booij (2000, 2002 and 2005), McCarthy (1981, 1983), Inkelas and Zoll (2005) and Inkelas (2011, 2014). According to Kaisse (2005), scholars have been attracted to the nature of this type of interface because the total morphological make-up of a word has considerable influence on its pronunciation which essentially proves how morphology interacts with

⁹ According to Caron (2013), Hyman (2014) and Sani (2012), assimilation as a phonological process has been generally acclaimed in the literature as the most widely attested phonological process that synchronically permeates through all morphological processes in the system of Hausa language.

phonology. This position clearly explicates how both morphologically conditioned phonology and process morphology are handled by the same rules or conditions¹⁰.

Despite the fact that one of the major issues in the study of phonology-morphology interface concerns the difficulties in separating morphology from other parts of the components of grammar¹¹, it is undoubtedly clear that it is different from other types of interfaces such as phonology-syntax. It has been argued that unlike other kind of interfaces (such as phonology-syntax, phonology-semantics/pragmatics, etc.) which are said to be unidirectional in nature (see Pullum and Zwicky 1988 for details on this), phonology-morphology interface is basically considered as bidirectional since the influential effects of both phonological and morphological operations are reciprocal in nature. It is in view of this that Booij (2000) lists different types of interactions between word-formation and phonology: such as the influence of morphological structure on the phonetic shape of complex words; and the role of phonological output conditions in the linearization of affixes, particularly as they are treated in Autosegmental theoretic framework. Similarly, in an attempt to explicate the two levels of linguistic analysis on a separate model within the literature on morphology-phonology interface, Inkelas (2005) summarizes ‘morphology’ as “generalizations about forms and meaning that relate words to one another within a language, and ‘phonology’ as generalizations about the sound patterns in that language”. In a similar revelation, Inkelas (2009, p. 14) puts it very succinctly by describing the common ground between phonology and morphology, and at the same time, their conditioning factors:

...morphology and phonology intersect insofar as the statement of morphological generalizations includes information about sound patterns (realizational morphology), and insofar as the statement of phonological generalizations includes information about morphology (morphologically conditioned phonology)...

In line with Inkelas (2009)’s definition, morphologically conditioned phonology often refers to a situation in which a particular phonological pattern is imposed on a proper subset of morphological constructions (such as affix, reduplicated element and

¹⁰ Rules here refer to the analysis of some phenomena in the derivational rule-based models and conditions are set to regulate the analysis in the Autosegmental models.

¹¹ This view is supported by Spencer (1991) who claims that morphology is unusual among the subdisciplines of Linguistics in that much of the interest of the subject derives not so much from the facts of morphology themselves, but from the way that morphology interacts with and relates to other branches of linguistics such as phonology and syntax.

compound word), and thus is not fully general in the lexical phonology of a language¹². In a similar perspective, Inkelas (2009) further posits that realizational or process morphology is considered here as the situation in which a morphological category is expounded by phonological processes other than concatenation of segmental morphemes.

As pointed out previously, a particular model that adequately handles the interaction between phonology and morphology is the theory of lexical phonology, which is usually associated with a third hypothesis that postulates the idea of ‘level ordering’¹³ (see Kiparsky 1982b and Booij 1997 for details on this). But the earlier conception of lexical phonology has subsequently been modified by Booij (2000) and Kiparsky (2000) who argue that the relevance of the distinction between lexical and post-lexical phonology carries over to multi-tiered derivational frameworks, such as Autosegmental Theory, which seriously attracted the attention of scholars within the parlance of theoretical linguistics. This conceptual adjustment led to a re-direction of research focus to tackle issues in the phenomena of phonology-morphology interface¹⁴. Fundamentally, the Autosegmental theoretic model makes a strong claim that phonological processes should result in improvements of output well-formedness of morphological construction, where the role of phonology conditioning morphological processes becomes more prominent and explicit. The main assumption put forward by Halle and Vergnaud (1987) with respect to phonology-morphology interface phenomenon concerns the notion which clearly posits the idea that a derivational theory of grammar indicates that a grammar that handles this kind of interface is that which advocates the trend in which words are fully constructed by the morphology and then interpreted by the phonology. According to them, the phonological system of a language usually kicks-in to repair the word (applying what is known as ‘repair-strategy’) especially when the morphological output form does not correspond with the phonological well-formed structure. This is achieved by either changing a feature specification, segmental insertion or by prosodic feature shift (tone)’’.

¹² For details on Lexical Phonology, see Kiparsky (1982, 1984 and 1986).

¹³ In the model of Lexical Phonology and Morphology, as posited by Kiparsky (1982), level ordering refers to a mechanism for expressing constraints on affix ordering, and the correlation between the order of affixes and their phonological behavior.

¹⁴ It should be noted that some scholars who worked on linguistic interface phenomena (McCarthy and Prince 1992, Prince and Smolensky 1993) have earlier attempted the separation of phonology and morphology in their analyses. In view of their positions, the central reasons for handling the two components separately was based on the conception that the traditional frameworks that were dominant in phonology for several decades assumed the parallel application of phonology and morphology rules and/or constraints.

Hyman (2012) further points out that in the context of African Linguistics, the phenomenon of phonology-morphology interface has been extensively studied by many scholars working on African languages who deeply focused their research perspectives on issues that systematically relate to the interface phenomena in relation to phonology-morphology. Most of these works mainly relate to the areas of tonal morphology (Welmers 1959); Cyclic tonology (Pulleyblank 1985, 1986); segmental featural affixes (Akinlabi 1996, 2011); non-concatenative morphology (McCarthy 1981) and reduplicative phonology (Downing 1999, 2000; Hyman, Inkelas and Sibanda 2009). In particular, there have been a lot of scholarly researches in the area of Hausa grammar which implies that a concise understanding of the phonology and morphology of the language requires the recognition of a number of phonological processes. Some of these processes are essentially historical in nature, although their existence is still evident in morphological alternations; whereas others still function as synchronic rules, but are not necessarily in an exceptionally total productive manner (see Newman 1972, 1977, 2000; Leben 1976; Schuh 1986 and Jaggar 2000 for details on this assertion).

2.3 Assimilation as phonological process

Phonological assimilation is indubitably one of the most scholarly attractive areas in the literature of phonology. The term ‘assimilation’ is usually captured in phonology with reference to variability in contexts of speech sounds that are naturally caused by the influence of one sound upon another. Ladefoged (1975) defines assimilation “as a process that involves changing one sound into another as a result of influence of a neighbouring sound”, and in the same way, Hyman (1975) sees assimilation in respect of segment “as a means by which segments acquire the features of surrounding segments”. This view on assimilation has been supported by McCarthy (2003) who equally sees it as a phonological process in which a segment changes to resemble its neighbours more closely, adding that processes of assimilation can be usefully distinguished by the distance between what he calls the ‘target segment’ and the source of the assimilation feature(s). Similarly, Bakovic (1999) affirms that the application of assimilation as a phonological process results in an agreement of two or more segments in their value for some phonological feature(s) or feature classes. This clearly shows that assimilation involves the sharing of ‘same features’ segments, and that the effect of such agreement may affect them adjacently or in a subjacent way. In essence, features of adjacent segments may combine so that one of the sounds may be

pronounced in such a way that features of, say, articulation of the preceding segment may, in anticipation, lead into those of a following segment and vice versa (Amfani 2007; Padgett 2002).

Furthermore, Jurget (2011) posits that “assimilation processes have essentially the same operational mechanisms attributed to segmental alternation which typically involves at least two segments. According to him, one of these segments is referred to as ‘the target’, which normally alternates in the presence of the other segment ‘the trigger’, but in most cases, not otherwise”. In essence, the ‘target’ segment acquires a phonological property¹⁵ of the ‘trigger’ where the target, the trigger and the phonological feature connecting the two are viewed as the three ingredients of phonological assimilation. Accordingly, any segmental alternation that lacks one of them is not considered as assimilation. This kind of assimilatory operation is viewed within the classical generative phonology (Chomsky & Halle 1968) as a process usually described in respect of feature-change that mostly affects sounds in clusters and strictly governed by rules¹⁶. In his descriptive account of laryngeal assimilation, Summerstein (1977) posits that “voicing assimilation in obstruent clusters is a matter of anticipation of a glottal state that is going to be required later in the cluster”. He further argues that the basic pattern of such anticipatory assimilation must evidently be to spread from one segment to the immediately preceding or following segment. A natural rule that captures obstruent voicing assimilation is formulated as shown below:

10. [-son] → [αvoice]/ — [-son/αvoice]

This rule simply states that every obstruent in the cluster should assimilate to the last obstruent in the cluster, skipping over any number of intervening obstruent. The main assumption is that in derivational frameworks, assimilation has always been regarded as evidence for rule ordering.

Another development in handling assimilation is based on the way it was approached in the framework of Autosegmental Phonology where the phenomenon of feature-spreading mechanism in accounting for assimilation is the central approach. It should be emphasized that the main idea in the theory of autosegmental phonology is

¹⁵ This phonological property can be characterized in terms of phonological feature, which in the simplest of cases, is realized as a single phonological feature of a ‘trigger’ that affects the ‘trargets’.

¹⁶ Phonological rules are defined by Goldsmith (1995) as mappings between two different levels of sound representations, and in the same way, Hayes (2009) describes phonological rules as generalizations about the differences in the pronunciation of a given sound in different environment.

the claim that all assimilation processes involve spreading of distinctive features¹⁷. The major function of autosegmental feature spreading is that it changes the coordination of the assimilating feature relative to the rest of the word. Therefore, accounting for assimilatory operation in the perspective of feature spreading is undoubtedly a remarkable improvement of the standard linear generative analysis concerning the general conception of the phenomenon of assimilation. This also exhibits certain level of superiority over previous approaches to assimilation within the generative phonology. For instance, the theory mainly treats assimilation as a very simple, natural process, and it establishes a clear connection between phonological assimilation and phonetic co-articulation. In fact, using the theory as an analytic framework has more advantage in describing assimilation over the linear rule-based analysis. This is because in the autosegmentalised representation, the feature or particular group of features can spread to neighbouring segments which greatly improves the description of assimilation processes. It is on this ground Mohanan (1983) and Clement (1985) point out that the representation of hierarchical organization of autosegmental tiers, combined with spreading account of assimilation, immediately predicts the existence of three common types of assimilation process in the world languages, namely; ‘total assimilatory process’, ‘partial assimilatory process’ and ‘single-feature assimilation’. It should be noted that detailed and elaborate discussion on the types of assimilation appears in the subsequent sub-sections.

It is important to emphasize that segmental assimilation is the primary source of evidence for ‘feature geometry’, a model of how different phonological features pattern together (Napoli 1996). Feature geometry explains this by positing a constituent, say, the ‘place node’, that includes place features like [*labial*] and [*dorsal*]. Spreading of the whole place node entails assimilation of all place features, as can be seen in the following:

11. a. Labial assimilation - /n + p/ → [mp]
 b. Dorsal assimilation - /n + k/ → [ŋk]

As seen in 11, assimilations of place feature generally involve the transfer of a collection of features which specifically involves assimilating the alveolar nasal to the place of articulation of the following non-nasal stops. It is clearly stated in Gussenhoven and Jacobs (2010) that phonological assimilations frequently show a non-

¹⁷ At the initial stage, a distinctive feature may be confined to a single segment, but the scope of the feature could be extended by an assimilation process to include one more additional segment.

arbitrary relationship between the structural description (SD) and the structural change (SC). Therefore, handling assimilation based on feature geometry may have relative problems, which involves the issue of feature grouping - although such a problem of feature grouping is solved by representing segments as tree, in which the nodes represent features and feature groups. In view of this, assimilation problem is naturally solved by assuming that a single node may be part of more than one tree.

2.3.1 Typological perspectives of assimilation

Phonological assimilation is the most common process in phonology cross-linguistically. Its patterns differ from one another – although several attempts have been made to come up with a unified analysis that will be known as ‘all assimilations pattern’ (see, for instance, Abercrombie 1967). In most instances, what is commonly found in the literature of phonology is the frequently asked question; what kinds of assimilation processes are there in the world’s languages? Impliedly, questions of this nature obviously indicate that there are various types of assimilation across languages which ascertain the fact that phonological assimilation may have different or various types, depending on the context and issue at stake. Generally, considering assimilations based on the extent to which the features of a segment influence the features of an adjacent segment, it is clear that the processes are broadly classified as either ‘partial’ or ‘total’. The former refers to a situation in which only some feature(s) of the target segment are affected or changed to look more like the trigger segment. On the other hand, the latter refers to the completeness in the change of the target segment such that it looks quite like the influential segment. This situation of partial or total effect of assimilation is shown in the following example:

- | | | | | |
|-----------|--------------|------------------|---------------------|--------------------------|
| 12. a. i. | in bæləns | → [im bæləns] | ‘imbalance’ | - (PPA) |
| | ii. | in lɒdʒɪkl | → [il lɒdʒɪkl] | ‘illogical’ - (TMA) |
| b. i. | gídán kámbá: | → [gídánj kámbá] | ‘name of a village’ | - (PPA) |
| | ii. | gádàr zàré: | → [gádàz zàré:] | ‘trap (someone)’ - (TMA) |

Forms in 12(a and b) are drawn from English and Hausa languages, respectively. They both demonstrate instances of ‘partial’ (12a (i) and 12b (i)) as well as ‘total’ (12a (ii) and 12b (ii)) assimilations. Thus, the *alveolar-nasal* /n/ in 12a (i) changes to a *bilabial-nasal* [m] due to its occurrence before an *bilabial* oral stop [b], in the same way as *alveolar nasal* in 12a (ii) /n/ changes exactly like its lateral alveolar. Similarly, the alveolar nasal /n/ in 12b (i) changes to a velar nasal stop in a partial manner following a

velar oral stop, just like the alveolar tap /r/ in 12b(ii) which changes totally to look like the following alveolar sibilant.

As it is, the focus in this section is mainly on the typological perspectives of the phonological assimilation and is directed towards explaining those types that are based on its locality and directionality. These types are often considered as the commonest typological patterns in the phonological assimilation processes. In addition to these patterns of assimilation, the section equally reviews Pavlik Radoslav's (2009) 'Classification of Assimilation' which, to the best of my knowledge, remains the most comprehensive and detailed classification so far in the literature of phonology. It covers almost all aspects of alternations in the process of phonological assimilation.

2.3.1.1 Locality: local and long-distance assimilations

Explaining the types of assimilation based on locality has to do with the description of the asymmetric nature of the two possible patterns of alternation in assimilation, namely; *local* and *long-distance* assimilatory alternations. To begin with the former, local assimilation is a process that affects segments in the adjacent position, which simply means that it is a form of phonological alternation in which two segments that are closely adjacent become more similar. The nature of alternation in local assimilation is such that affect nearly every phonological feature. As clearly pointed out by Patrick (2006), local assimilation is best described as a form of spreading of features so that neighboring segments share a sub-segmental specification in some way. He further asserts that any process of local or 'contact' assimilation must involve an instance in which a segment takes on a property of an adjacent segment. According to many scholars, a locally contextual assimilatory process is the most common type attested cross-linguistically and has been generally proven to have an important role in the phonological theory and theorization (McCarthy 1994; Hume and Odden 1996; Padgett 2002; Lombardi 1999; Cho 1999; Borowsky 2000, inter alia).

There are certain phonological issues that are usually raised with regards to local assimilatory operation and they are often formulated in form of questions that seek to address operational issues in the patterns of assimilatory alternations. These include questions like the following:

- i. What class of features actually assimilates?
- ii. What group of features specifically assimilates together?
- iii. What is the extent of influence of morphological and prosodic context?

iv. What are the roles of production and perception in the local assimilation?

A critical look at the questions above reveals that they strictly focus on phonological assimilation per se and as such, they concern the nature and representation of local assimilation. Moreover, issues raised in the questions are often more specific and usually come up in the discussion of some categories of data that relate mainly to local assimilation. The forms cited 12(a and b) serve as a very good example of local assimilation since the nature of alternation therein demonstrates adjacency positions, even though they appear cross-morphemically. This is quite certain in most phonological systems. In fact, recent expositions on local assimilation in most of the literature on phonological assimilation focus on cross-morphemic assimilation thereby a lot of such works focused on patterns of laryngeal assimilations. Thus, consider the following Ukrainian voicing assimilation cited in Kiparsky (1985):

13. a. /jak zɛ/ → [jag zɛ] 'how'
b. /bez tebe/ → [bez tebe] 'without you'

The data in 13 show that there is local assimilation to voice feature (since the voicing alternation only takes place in 13a.), and it also shows a clear case of cross-morphemic assimilation. It is, however, important to note that local assimilation can take place in form of intra-morphemic alternation, such that it looks like V+C or C+V. Consider the assimilation in the English nominal plural and verbal tense inflection:

14. i. a. /tæp+z/ → [tæps] 'taps'
b. /tæb+z/ → [tæbz] 'tabs'
ii. a. /pik+d/ → [pik+t] 'picked'
b. /kuk+d/ → [kuk+t] 'cooked'

As can be seen, forms in 14 show similar instance of voicing assimilation with those in 13 above. However, while the nature of alternation in 13 (a) is across two separate morphemes, the one in 14 (i-ii) is undoubtedly within the two attached morphemes. Also, the alternation in 13 is that of voicing whereas that in 14 is a case of devoicing. Accounting for the kind of alternations in examples 13 and 14 within the rule-based derivational framework is usually done by positing 'voicing' and 'devoicing' derivational rules as the main 'triggers' for the feature alternation in the local assimilation.

In assimilation, ‘locality’ can also be described in terms of subjacent influence of segments, which is known as long-distance assimilation¹⁸. Long-distance assimilation (usually called harmony), is an instance in which the target and source segments may be quite far apart, though they are usually in the same word (McCarthy and Smith 2003). Although long-distance assimilation is very rare in Hausa, there exists certain situation in several world languages in which the said type of assimilation typically exists. Such instances include environments where the ‘trigger’ and ‘target’ of assimilation tend not to be immediately string-adjacent, as in the case of vowel harmony. For instance, features such as [round], [back] and [ATR] often assimilate from vowel to vowel within a word, but such assimilation is usually not local at the level of the segment, since vowels are most often separated by consonants. Generally, even though this type of assimilation that involves consonants occurs across languages, it appears to be relatively rarer phenomenon but vowels assimilating to each other in neighbouring syllables are quite common – a typical example being that of umlaut (see Hock 1986 for detailed description on umlautic phenomenon).

It is often claimed that if a long-distance assimilation involves consonant sounds then that possibility is known as ‘consonant harmony’. In simple terms, consonant harmony refers to assimilation for a property that is phonetically associated with articulatory or acoustic gestures between two or more consonants that are not adjacent where intervening segments are not affected by the assimilating property at the surface level. Although this phenomenon is generally regarded as ‘harmony’ when making reference to consonant segments, the term ‘consonant agreement’ is equally used in the literature to denote long-distance assimilation¹⁹. Based on the positions of some of the proponents of Autosegmental Phonology like McCarthy (1989) and Goldsmith (1990), assimilations of this type have, to some extent, played significant role in debates concerning the general harmony patterns of segments with respect to several issues, among which are: locality of interaction, transparency or blocking effects as well as directionality. In view of this, the current research to explore and analyse all possibilities of segmentally featural assimilations that relate to segmental harmonies using the multi-tiered representation mechanism of feature-spreading as assumed in Autosegmental theoretic framework.

¹⁸ The general assumption in the conception of long-distant assimilation is that segments assimilate to distance for some acoustic and articulatory property.

¹⁹ Refer to Rose (2011) for detailed descriptive examples of different kind of long-distant assimilations based on feature classification.

2.3.1.2 Directionality: progressive and regressive assimilations

Phonological assimilation has also been described in the literature on the basis of directionality of segmental feature spreading. As noted in the preceding discussion, any assimilation that is described based on locality is seen as a process whereby adjacent segments become more similar to each other in voicing, manner or place of articulation in order to facilitate the flow of pronunciation. The direction of feature alternation in local (and sometimes in non-local) assimilation is usually being ascertained by considering the possibility that features of an articulation may lead into or ‘anticipate’ those of a following segment – this may also be referred to as ‘leading assimilation’. Conversely, articulation features can be held over from preceding segment, so that the articulators lag in their movement, which may be referred to as ‘lagging assimilation’. In relation to this, Steriade (2000) makes a generalization about the regularities in the direction of assimilation, particularly ‘place assimilation’. According to him, assimilation usually proceeds progressively in intervocalic clusters composed of the class of alveolar, palato-alveolar, labial or velar consonants. He however pointed out that assimilation may consistently be regressive, especially in clusters composed of retroflex and alveolar sounds. Some fundamental arguments came up in the early 90s which claimed that, based on cross-linguistic evidence, assimilation is typically unidirectional and there are substantive motivations behind that. But despite all these motivations, only certain segments with some value of a feature or feature class trigger or undergo the kind of rightward or leftward assimilation for those categories of features (Pulleyblank 1997).

In spite of the fact that this conception remains substantially motivated, it is, however, claimed to have been restricted to an alternation of a few feature specifications. For instance, taking voicing assimilation into consideration, the key factor that often enters into determination of directionality is actually morphological status, which indicates that affix segments often assimilate to root/stem segments. More so, this may not necessarily be only in respect of voicing assimilation, but also take place even in nasal place assimilation. As cited in example 14 (of section 2.3.1.1) above, assimilation is consistent in terms of morphological status since the affix segments therein consistently assimilate to the root/stem segments. In this regard, certain technical conditions may be imposed since it is a fact that one of the common attributes of languages with respect to phonological behaviour is the imposition of conditions on assimilation. These conditions usually appear to be independent of the

specification of the assimilatory feature on the relevant adjacent segment.²⁰ The fundamental assumption is that the process of assimilation can work in both directions (rightward or leftward). An assimilation in which the following sound affects the preceding sound is said to be regressive in nature and is therefore called ‘regressive assimilation’. On the contrary, an assimilation in which the preceding sound affects the sound that immediately follows it is considered as progressive and is therefore, called ‘progressive assimilation’²¹.

It is, therefore, important to note that in most cases of phonological alternations, especially those that pertain to assimilation processes, some patterns of assimilation may be quite sensitive to the right edge of a particular phonological domain such as the syllable, while others are limited to a large domain such as the prosodic word or phonological phrase (Napoli, 2006). This conception of edge sensitivity or directionality in the local or non-local assimilation goes beyond the segmental alternations since it is commonly attested in the prosodic patterns of languages. Tonal assimilation, for instance, is generally considered as a long-distance phenomenon, applying at least from vowel to vowel across intervening consonants, and often across stretches of multiple syllables²². But what remains crucial in the phenomenon of phonological assimilation with regards to directionality is the issue of cross-linguistic voicing assimilation. This issue of directionality in assimilatory operation, particularly in voicing assimilation²³, has been the focus of most researches on assimilation (Kiparsky 1985; Lombardi 1999 and Padgett 2002). Similarly, apart from the fact that voicing assimilation occurs across morphemes and word boundaries, it also works in both directions of either left-to-right or right-to-left. This is basically the reason for referring to the patterns of assimilations as regressive or progressive assimilations – depending on the direction. It is evidently established in many languages that in most cases of its occurrence, when voicing assimilation affects adjacent segments, it often

²⁰ Consider also the instances of voicing assimilation which is often limited to cluster of obstruents (Lombardi, 1999); place assimilation, which is often limited to nasals and consonant clusters; and palatalization, which is often limited to non-labial consonants (Jun 2004).

²¹ It is, however, widely attested across languages that the regressive type is usually assumed to be more common than the progressive type.

²² The phenomenon of tonal assimilation has been discussed extensively in Hyman (1975:221), where he recognized assimilation at tonal level in respect of African languages, and accordingly asserts that “it behaves like the rules involving segments which can either be ‘anticipatory’ or ‘perseverative’, adding that their assimilation patterns are grouped according to whether the nature of assimilation is vertical or horizontal”. Further, according to Hyman (1975), “vertical tonal assimilations occur when tones are raised or lowered in the environment of higher or lower tones, whereas, in horizontal tonal assimilation the dimension is either forward or backward”.

²³ It should be noted that the phenomenon of voicing assimilation is attested in a significant number of languages belonging to different language families.

appears as a regressive assimilatory pattern (see Lombardi (1999), for details on this position). However, the situation in the English voicing assimilation, particularly that of the nominal inflection in plurals as well as verbal inflection in past tense verbs, is exceptionally progressive in nature. This instance is shown in example 5 above, where the plural and past tense suffixes assimilate the laryngeal (voice) feature of the final segment of the stem.

2.4 Pavlik Radoslav (2009)'s classification of assimilation

A 'typology of assimilation' by Pavlik (2009) is a famous publication, and so far remains the most in-depth research on assimilation in the literature. The research presents taxonomy of phonological assimilation concerning the general phenomenon of phonetic/phonological assimilation. The research provides a succinct definition of the term assimilation which, according to him, is considered as a phenomenon in phonology that refers to a variability of speech sounds in context that is usually caused by the influence of one sound on another. He further posits that it is an operation through which a particular sound can be replaced either totally or partially under the influence of another sound which occurs near to it. The process has also been described as a way of adjusting the nature of speech sounds based on their environment. The study mainly focused on the classification of different types of assimilatory operations which particularly occur in natural connected speech. It largely concentrates on the review of literature thereby provides comprehensive descriptions of several specific types of assimilation that have not been expounded previously. In the same vein, it gives a typology of assimilation that is a bit complex in nature based on seventeen different perspectives of analysis which in turn formed 60 different types of assimilatory operations. The 17 analytical perspectives in describing the patterns of assimilation are itemized below²⁴:

- The type of the sound involved in assimilatory process.
- Assimilation based on phonemic/phonetic distinction.
- The time of origin of the assimilatory process.
- The type of systemic relation of sounds involved in the assimilation.
- The position of the sounds affected by the assimilation on the syntagmatic axis.
- The degree of opacity in the sequences of sounds in the assimilatory domain.

²⁴ Although these analytic perspectives are essentially relevant for a description of any kind of phonological assimilation, they cannot be considered to be exhaustive despite the fact that they offer a more complex nature of assimilations different from the most common types found in the literature.

- The degree of stability/fixity of sounds in the assimilatory domain.
- The direction of the influential relation of one segment or feature on another.
- The degree of the similarity of the segments involved in the assimilation.
- The degree to which the articulatory gestures are transferred to the target sound.
- The originating point of the assimilation in the communication chain.
- The extent of influence of the assimilating segments on the syntagmatic axis.
- The distance between the assimilator and the assimilee in the process.
- The type of assimilation based on the active articulatory organ.
- Assimilation based on the place of articulation.
- Assimilation based on the manner of articulation.
- Assimilation based on voicing.

Pavlik (2009) posits that the classification of naturally plausible assimilations based on the analytic perspectives above led to the conception that they are considered as forms that function on different levels of abstraction and their use and manner of their description depends on how they are approached in terms of their application. An important thing to note, however, is the fact that every type of assimilatory process can be characterized simultaneously from the perspective of the aforesaid approaches.

As pointed out earlier, the said seventeen analytical perspectives in classifying assimilation processes yield a total of sixty (60) different assimilations based on typology. The first perspective looks at assimilation in respect of the type of sounds undergoing assimilation, where, trivially, a distinction is drawn between *vocalic* and *consonantal* assimilations. According to the finding of this research (Pavlik 2009), vocalic assimilations (involving only vowel sounds) occur when the assimilator exerts influence on the vocalic element and, on the other hand, consonantal assimilations usually involve consonant segment as an assimilee in the process of assimilation. The second perspective divides assimilations into *phonemic* and *phonetic* types. Based on this division, new phonemes are naturally formed through the process of phonemic assimilations, whereas phonetic segments are produced in the assimilatory processes when the assimilant²⁵ is not a separate phenomenon in a given language or dialect. The third perspective assumes a situation where assimilations are divided in accordance

²⁵ The trio concepts in assimilation: assimilee, assimilator and assimilant have been expounded by Pavlik (2009). Thus, according to him, it is assumed in the notion of assimilation the existence of at least two segments, which by reciprocal influence, change their phonetic property. The concept ‘assimilee’ refers to the segments which are being assimilated; ‘assimilator’ refers to the segment which assimilates another segment; and ‘assimilant’ which implies the segment resulting from the process of assimilation.

with the time of origin. Here, the division led to the classification of assimilations into two broad types, which include *diachronic* and *synchronic*. The former refers to an assimilation type which has taken place in the course of development of a language, and the latter is considered as an assimilation that occurs when words are juxtaposed in connected speech in a sentence or in the formation of compounds. The fourth perspective looks at the division of assimilation processes in terms of *syntagmatic* types which involves those assimilations in which the interaction of sounds is on syntagmatic axis, and the other division, is based on *paradigmatic* types, which occur when sounds interact on a paradigmatic axis. Similarly, the fifth perspective further classified assimilations based on the position on the syntagmatic axis into four interrelated types, namely: *inter-lexemic*, which is a type of assimilation that occurs between lexemes; *intra-lexemic*, which is a type of assimilations that occur within the lexemes, and may be further divided into *intra-morphemic* and *inter-morphemic* sub-types.

Furthermore, Pavlik (2009) looks at assimilations in respect of another analytic perspective which is based on the degree of opacity, thereby divided assimilation processes into *opaque* and *transparent* types. Opaque assimilations are those in which their original form is no longer traceable, while transparent assimilations are directly the reverse of the opaque types. Pavlik further looks at the division of assimilation types on the basis of the degree of stability (fixity). Under this classification, assimilations are of two types, namely: *stable assimilations*, which always occur as an assimilated form in most languages/dialects; and *variable assimilations*, which may probably occur in a particular context, often depend on the rate of speech and various factors of communication styles. Likewise, another perspective of division also classified assimilations into three broad types, where each type involves two sub-types. These assimilations are: *unidirectional*, which involves *progressive* and *regressive* types; *bidirectional*, which involves *double* and *bilateral* types, and lastly; *reciprocal*, which involves *coalescent* and *non-coalescent* assimilation types. Further, Pavlik points out that “assimilations can as well be divided on the basis of how they are classified according to the degree of the similarity of the segments involved in the assimilatory process. On this note, he categorized them as either *complete* (total) or *incomplete* (partial). According to him, a complete assimilation implies a situation whereby the segment assimilated becomes synchronically adjusted to the assimilating segment thereby both of them have the same type of features. However, in the case of partial assimilation, the segment that get assimilated is usually adjusted partially to be closely

like the assimilating segment thereby shares with it some features. In the same manner, he further divided assimilations on the basis of the degree of influence of the assimilating articulatory features on the assimilated segment. In this case, two types of assimilations are identified: *categorical assimilation* – a type of assimilation that occurs when a particular articulatory feature of the assimilated segment changes categorically (or fully) to another feature in the same context. On the other hand, *gradient assimilation* is a type of assimilatory process that occurs when a particular articulatory feature of the assimilated segment does not change categorically (or fully) to another feature in the same context.

Another perspective of classifying assimilation, as pointed out by Pavlik (2009), is that which considers “the point at which the assimilation originates in the communication chain”. Under this analytic perspective, assimilations are categorized into three main phonetic classificatory groups, namely: *articulatory assimilation*, which naturally occurs when an articulatory feature of a given segment changes or becomes influenced by the articulatory feature of another segment; *acoustic assimilation*, which also occurs when a segment changes as a result of the influence of acoustic feature of another segment. Mostly, this type of assimilation is traceable by means of acoustic analysis using the techniques of Oscillography or Spectrography; and the third group is *auditory assimilation*, which is often detected by means of auditory testing²⁶. Accordingly, assimilations are further divided on the basis of the level of influence of the assimilating segment syntagmatically, where two types are identified here, namely: *mono-segmental* and *poly-segmental* assimilations. The former occurs when there is only one segment being assimilated by another, and the latter occurs when two or more segments become assimilated. Similarly, Pavlik (2009) considers the range of distance between the assimilating segment and the one being assimilated as another analytic perspective in classifying the typology of assimilations. In this situation, it all depends on the presence or absence of intervening segments between the the two segments involved in the assimilatory operation, assimilations are often distinguished between *contiguous* (local/contact) and *non-contiguous* (distant/long-distance).²⁷ The former type

²⁶ It should be noted here that the phenomenon of auditory phonetics is not generally a common research ground, and as such scholars of phonetics often concentrate on the phenomena of articulatory and acoustics phonetics. However, it has been confirmed in the literature that there is a type of assimilation that occurs only in auditory perception (see Ohala (1986, 1989, 1990a, 1993, for detailed account on auditory assimilatory phenomenon).

²⁷ In respect of the contiguous assimilations, Pavlik (2009) asserts that almost all of the types of assimilation cited in the foregoing discussion belong or are of this type. Likewise, non-contaguous assimilation may be

of assimilation occurs when there are no intervening segments between the trigger and target segment(s), while the latter occurs when there are one or more intervening segments between the two segments involved in the assimilation.

In addition to the foregoing perspectives considered in classifying assimilation based on typology, Pavlik (2009) also looks at them from the point of view of the “active organs that are involved in speech production”. Under this analytic perspective, assimilations are classified in accordance with the active articulatory organs of speech that are part of the assimilatory processes, and thereby came up with the following types of assimilation that are peculiar to the activities of various organs of articulation:

- Vocal-fold or laryngeal assimilation
- Velar or soft-palate assimilation
- Lingual assimilation
- Coronal (laminal and/or apical) assimilation
- Dorsal assimilation
- Radical assimilation
- Labial assimilation
- Mandibular assimilation

It can be noticed that the listed assimilation types above are phonetic in nature which largely have to do with the involvement or articulatory organs that are relevant in speech production. According to Pavlik (2009), the vocal-fold or laryngeal assimilation refers to a type of assimilation that occurs when the activity of the vocal-folds associated with the assimilating segment influences the segment being assimilated thereby results in voicing or loss of voicing. In the same vein, *velar* assimilation also occurs when the activity of the velum associated with the assimilating segment affects the segment being assimilated and in that way, it results in nasalization. And, accordingly, the lingual type of assimilation subsumes *coronal*, *dorsal* and *radical* assimilation types²⁸. Furthermore, *labial* and *mandibular* assimilations are described, respectively, “as an instance in which the state and the activity of the lips is transferred from the assimilator to the assimilee, and an instance in which the state and the activity of the mandible (the lower jaw) is transferred from the assimilator to the assimilee”. In a more specific analytic perspective in the classification of assimilations based on

synchronously demonstrated on vowel-consonant-vowel sequences, where there is mutual influence of the two vowels upon each other, in spite of the presence of the intervening consonant (Carney and Moll 1971; Gay 1979)

²⁸ For detailed and descriptive examples of ‘coronal’, ‘dorsal’ and ‘radical’ assimilation types, refer to Gusseenhoven and Jacobs (1998, p. 8) and Ladefoged (1999, p. 596)

typology, Pavlik (2009) considers, in totality, the place of articulation. In this case, assimilations are classified according to the various places of articulation, and thereby the following types can be distinguished: “*labial, bilabial, labiodental, dental, alveolar, postalveolar, retroflex, palate-alveolar, palatal, velar, uvular, pharyngeal and glottal assimilations*” (refer to Pavlik (2009, pp 13-15) for detailed exposition on this types).

The other similar analytic perspective in classifying assimilation is that which is based on the manner of articulation. Normally, if we consider the traditional sense of the production of speech sounds, we discover that sounds are characterized according to the manner in which they are produced²⁹. According to Pavlik (2009), two types of assimilation are distinguished based on manner of articulation: *aperture assimilation* and *airstream-direction assimilation*. Aperture assimilation is an assimilatory operation that occurs when certain aperture features associated with the assimilating segment influenced the changes in the segment being assimilated. Accordingly, this type of assimilation is further divided into two assimilatory processes known as “*incrementization* and *decrementization*”. According to Pavlic (2009), the former type is a process that causes size of aperture of the segment being assimilated to increase under the influence of the adjacent segment, while the latter, is a process during which the size of the aperture of the segment being assimilated decreases under the influence of the assimilator. Similarly, the second type under this characterization is the assimilation based on airstream-direction, which occurs when the airstream features of the assimilating segment influenced the segment that gets assimilated. This type of assimilation has also been further divided into two: “*oral plosion*”, which implies that the extent of the release of a plosive feature determines the way the target segment in the assimilatory process becomes assimilated in the assimilated *manner* feature of the following segment. The nature of assimilation under oral plosion may also be divided into *full oral plosion* (which may be *central* or *lateral plosion*)³⁰ or *incomplete oral plosion* that has no audible release. In the most cases of this type of non-audible release of plosive features, there is a level of release of the plosive consonant with a simultaneous plosive occlusion formed elsewhere in the oral cavity.

²⁹ It should be noted, however, that some linguists: Abercrombie (1967, pp. 47-50); Jones (1972, pp. 45-48); Gimson and Cruttenden (1994, pp. 30-31) have earlier notes that characteristics that are attributable to manner of articulation make the issue very complicated, and often locate differences in the definitions and use of this term, manner.

³⁰ There are several works cited in Pavlik (2009) which confirm the centrality and laterality of plosion in the manner assimilations. Thus, in central plosion the air escapes over one or both sides of the tongue (cf. Abercrombie 1964, p. 174; Jones 1972, p. 157; O’connor 1973, p. 136; Ladefoged 1975, p. 48, inter alia).

Moreover, apart from the oral plosion, assimilation may be classified based on *nasal plosion*. The type of assimilation based on the nasal plosion is such in which the extent of the release of a plosive consonant influenced the target assimilated segment based on the nature of the airstream direction of the following nasal csegment. Simply put, the release is made through the nasal cavity. Nasal plosion usually occurs when a plosive is followed by a homorganic nasal consonant - although a homorganic nasal is not always a necessary condition³¹. The last analytic perspective in the Pavlik's (2009) classification of assimilations based on typology is that in which the phenomenon of *voicing* is taken into consideration. Under this perspective, assimilation is traditionally classified according to the participation or lack of participation of the vocal folds in the production of speech sounds, where a distinction is usually drawn between *voicing* and *devoicing*. Voicing assimilation (also called sonorization (Abercrombie 1972) occurs when the voicing property of the assimilator is transferred to a voiceless assimilee. On the other hand, devoicing assimilation occurs when the feature of voicelessness of the assimilator is transferred to a voiced assimilee. Examples were drawn from Slovak language to demonstrate this kind of assimilation (Pavlik 2009, p.17).

Apart from his comprehensive classification of assimilatory processes across natural languages, Pavlik's (2009) attempts to provide a detailed analytic tool for the analysis of assimilations based on typology by making representative comparison cross-linguistically. It should be noted, as stated earlier, that assimilations can be simultaneously analyzed using some or all of the perspectives outlined above. In the same way, the analytic perspectives are essentially relevant in dealing with the complexity of sound changes within both assimilatory and other phonological processes. This could also mean to say, as Pavlik (2009) puts it, changes in a given sound as they occur in connected-speech are best described in the light of differences in assimilatory operations. To sum everything up, Pavlik (2009) has succeeded in coming up with the general typology of phonological assimilation based on seventeen different perspectives which clearly confirm that analysis using them will likely generate sixty different types of assimilation with descriptive examples.

³¹ Refer to Pavlik (2009, p. 17) for detailed descriptive examples of the occurrence of this kind of assimilation, as further observational arguments.

2.5 Exploring the phenomenon of palatalisation as assimilatory process

It shall be seen in the subsequent data analysis that part of the data that shows a clear instance of phonology-morphology interconnectivity in the formation of deverbalised adjectives in Hausa exhibit palatalisation as assimilatory operation where alveolars become palatalized in the context of suffixal reduplication. The term ‘palatalisation’, has been defined in many different ways that are quite interrelated, particularly in area of phonology. Thus, according to Matthews (1997), palatalisation is defined as a process that results in changing a sound to a type articulated broadly in the palatal or palato-alveolar region. The process can also be seen as a form of articulation that changes a stop or fricative segment that is accompanied by approximation of the tongue towards the hard palate region. Similarly, going by the view of Kochetov (2011 and 2016), palatalisation denotes “a phonological process by which consonants acquire secondary palatal articulation or shift their primary place to, or close to, the palatal region”³². Kochetov (2011) further specified that this situation usually happens under the influence of an adjacent vowel and/or a palatal glide which signifies the fact that palatalisation is a type of consonant-vowel interaction³³. In addition, he points out clearly that “this kind of interaction is usually seen as a synchronic phonological process manifested in segmental alternations”. Obviously, the most common issue in the account of palatalisation as a phonological process is a focus on the characteristic element of consonant-vowel interaction. In most cases where this interaction occurs, the trigger is usually in the form of a vowel and the target is a consonant. This is one aspect of palatalisation that makes it interesting for the development of feature theories (Bateman 2011; Akinlabi 2007).

Evidently, many formal accounts of palatalisation that have been undertaken over some periods of time have faced considerable challenges (Wonderly 1951; Akinlabi 1996, 2007 and Dell 1980). These challenges partly stem from the fact that palatalisation processes show a wide range of manifestations both across languages and within a given language. In a quite similar opinion, Kramer and Urek (2016) affirm that the phonological phenomenon of palatalisation is widely attested in the world’s languages and probably the most common universal phonological assimilatory

³² Contrary to this conception on palatalisation, Akinlabi (2007) considers palatalisation as morphological process, particularly in relation to Zoque (a southern Mexican language). According to him, palatalisation in this language demonstrates local realization whereby the affix must be realized at the edge and no where else.

³³ In respect of this, Hyman (1975) shades additional light which postulates that ‘palatalisation’ has been typically viewed as a classic example of natural phonological process which is widely attested across world languages and has a clear phonetic motivation, such as in consonant-to-vowel coarticulation.

process³⁴. Since palatalisation is a common phenomenon in the world's languages, any attempt to conduct a detailed investigation on the phenomenon from either an individual language or cross-linguistic perspective, must be explored by at least asking the following questions:

- In what ways the concept of palatalisation is defined?
- In what ways the concept of palatalisation is commonly conceived?
- What sound classes are subject to palatalisation?
- What are the triggers and targets in palatalisation as assimilatory process?²⁶
- What is the likely outcome of palatalisation?

Addressing these phenomenal questions will give a comprehensively wide range of coverage in handling the phenomenon of palatalisation as a phonological process. However, in the subsequent development of phonological theorization, particularly in the autosegmental model of phonological analysis, the process of palatalisation is handled in a relatively different manner, where the palatal feature(s) naturally spread to the neighbouring adjacent or subjacent segment(s) in bidirectional dimensions.

2.5.1 Issues in the classification of palatalisation

As discussed above, it is notably clear that the process of palatalisation in phonology has been viewed as one of the most prominent assimilatory processes across languages. In most instances, the process primarily occurs as result of the interaction of consonants with front high vowels and the palatal glide. In his position, Bateman (2011, p. 17) points out that palatalisation “is one of the first phonological processes that typically has easily identifiable classes of ‘triggers’ (sounds that conditioned the change) and ‘targets’ (sounds that undergo palatalisation)”³⁵. So far, the most comprehensive research on the typology of palatalisation is that which was carried out by Bateman (2011), where he divides palatalisation into two general types: *full* and *secondary*, as indicated below:

³⁴ Although it is quite beyond any scholarly doubt that the phenomenon of palatalisation is attested across world languages, it is very certain that natural ‘place assimilation’ has been claimed to be the most common phonological process which varies immensely in its phonological and morphological conditions cross-linguistically (see Lombardi 1999 and Pavlik 2009 for details on this).

³⁵ Contrary to this assertion, Kachetov (2011:21) has identified what he termed ‘anti palatalisation’ which usually incorporates the process of deletion and/or epentesis in order to satisfy the otherwise palatalisation inducing conditions.

...in full palatalisation, a consonant changes its primary place of articulation and often its manner of articulation, while moving towards the palatal region of the vocal tract when adjacent to a high and/or front vowel. However, in secondary palatalisation, a consonant acquires a secondary palatal articulation when adjacent to a high and/or front vowel (2011, pp. 589-590).

Bateman's (2011) division of palatalisation is assumed to consider the assimilatory process on a general note, and to the best of my knowledge, it remains the most extensive typological perspective of the process so far.

However, In the case of Hausa language, Newman (2000, p, 414) looks at palatalisation in two different, but interrelated perspectives, namely; *active* and *anticipatory* palatalisations. He argues that the process of palatalisation is significant both as an active and as the historical result of the process. According to him, "it is active when the root-coda alveolars ([s], [z] and [t]) become respectively palatalised (to [ʃ], [dʒ] and [tʃ]), when the front vowel ([i], [e]) immediately follow them"³⁶. This is exemplified in the following:

Present (verb) Past form

- | | | | | | | |
|--------|------|--------|---|-------|---------|-------------|
| 15. a. | gàsà | (gasa) | → | gáʃè | (gashe) | 'to roast' |
| b. | ʃíʒà | (ciza) | → | ʃíʒè | (cije) | 'to bite' |
| c. | ʃítá | (fita) | → | ʃítʃè | (fice) | 'to go out' |

The verb forms in 15 explicate the phenomenon of active palatalisation in Hausa. In the same line of discussion, Newman (2000) declares that palatalisation of this nature might be an automatic phonological rule in the earlier period. However, he adds that "the synchronic operation of palatalisation regularly accompanies morphological formations involving the addition of suffixal front vowel", and in the same vein, this kind of palatalisation affects only the obstruent alveolar consonants, as their sonorant counterpart (such as [n], [l] and [r]) do not undergo palatalisation.

The second type of palatalisation attested in Hausa language is called 'anticipatory palatalisation', which has to do with the manner of its occurrence as a phonological operation. Newman (2000, p. 417) describes this type of palatalisation as an assimilatory process in which an obstruent alveolar occurring before a non-front

³⁶ This position cannot be generalised as it does not apply across every aspect of the language. It is quite common to find the same series of alveolar sounds in the same environment but not palatalised. This can be well attributed to the nature of heavy influx of loanwords from English and Arabic languages.

vowel takes on the vowel feature and becomes palatalised in the following syllable – although with a sort of germination. Consider the forms in the following example:

16. a. gùdù‘run’ → gùdádʒdʒ-é (cf. *gùdádé)‘a runaway’

b. mútù‘to die’ → màtáfʃ:é (cf. *màtáté)‘dead (person/animal/thing)’

Forms in 16 above show that the nature of palatalisation is obviously not the type described as active in the preceding discussion since there is no any evidence of adjacent influence.

2.6 Reduplication as morphological process

The phenomenon of morphological reduplication is broadly considered as one of the most productive morphological operation in morphology, cross-linguistically. This process has to do with word-formation in the system of language which largely involves repetition of all or part of the word constituent to convey some form of meaning. The most widely used material on reduplication in the literature, which deeply contextualised the process in the domain of phonology-morphology interface and with certain level theoretical inclination, is the article authored by Marantz (1982) titled “Re-reduplication”. According to him, the phenomenon of reduplication can be generally seen “as a morphological process relating a base form of a morpheme or stem to a derived form that may be analysed as being constructed from the base form via the affixation of phonemic material which is necessarily identical in whole or in part to the phonemic content of the base form”. In a similar viewpoint, Haspelmath and Sims (2010), posit that reduplication is a process which involves copying part of a word then attaching the copy in some specific way to the original word. In most cases, as posited by Amfani (2007), “this part of word is technically known as ‘morpheme, which is usually reduplicated to show or indicates a repeated action (in the case of verb formation) or a multiplicity of things (in the case of noun formation)”. Therefore, the nature of copying in reduplication can either be isolative or accompanied by other word formation processes, and sometimes with phonological modifications. In a quite similar development, Bauer (2003) sees ‘reduplication’ as process of word- formation that mostly involves identity of some sort, either totally or partially. According to him, this identity involves the repetition of the ‘root’ or ‘stem’ of a word or part of it. This notion of identity has equally been emphasized by McCarthy and Prince (1995, p. 1) in an article titled; ‘*Faithfulness and Reduplicative Identity*’. According to them, reduplication is a matter of identity, where the reduplicative morpheme copies the base

– although they agree on the fact that perfect identity cannot be always achieved. Therefore, the fact remains that even though reduplicative morphemes copy the base to which they are attached, the perfect copying is not always achieved in that way.

As earlier mentioned, it is generally conceived that reduplication is a common morphological process in many languages of the world, which is opined to be a grammatical or semantic contrast by repeating all or part of the base to which it applies. Going by this assertion, there are two broad types of reduplication, namely; ‘*total/full*’ and ‘*partial*’. The repetition or copying of the entire base yields full reduplication, and in contrast, the repetition of part of the base indicates partial reduplication. In essence, ‘total reduplication’ has to do with complete root, stem or even word repetition, with minimal or no phonological modification³⁷, while ‘partial reduplication’ has to do with the repetition of a constituent element of part of a word with potential phonological modifications. Looking at this typological classification of reduplication in the contexts of theoretical formalization, it is well evident in the literature that issues related to full’ and ‘partial’ reduplication are well surveyed and analyzed in the works of many scholars (see particularly, Moravcsik (1998), Marantz (1982), McCarthy and Prince (1986), (1995) and Steriade (1988) for clarification). In furtherance to the aforesaid types of reduplication, Inkelas and Zoll (2005) extended the typology of reduplication with the additional three types, namely; *echo reduplication*, *synonym reduplication* and *syntactic doubling*. According to them, the ‘echo reduplication’ deals with repetition of word with replacement of the onset and sometimes the nucleus of the syllable or internal materials of the reduplicative morpheme. Similarly, ‘synonym reduplication’ has to do with juxtaposition of the two semantically related roots, stems or words. Lastly, they identified another type which, according to them, is known as ‘syntactic doubling’, is a form of reduplication in which a single morphosyntactic word or constituent occurs twice in the sentence, often with obligatory intervening material or morphological element.

The process of morphological reduplication has been evidently proven to be used extensively in many languages of the world to indicate a number of morphological sub-categorization (like tense, gender and number) with relative semantic variability. In the same way, the diversity of form and meaning in reduplicative morphology led to the

³⁷Universally, total reduplication has varied mechanisms of occurrence, handled with different theoretical approaches. The most prominent proposal was made by Marantz (1982) which claims that total reduplication is usually achieved by by morpheme or stem repetition.

attraction of serious scholarly attention within the area of morphology. Most of the works advanced in relation to this phenomenon focused on addressing some fundamental issues raised in the nature of repetition mechanism and how reduplicative morphemes (or reduplicants) should be captured and represented. In respect of this, the process of morphological reduplication has a long history of scholarly works that can be traced far back to the work of Christuller (1875), and subsequently in works like Schachter and Fromkin (1968); Wilbur (1973a, b and c); Marantz (1982); Lieber (1987); Dolphyne (1988); McCarthy and Prince (1988, 1990); Newman (1989); Inkelas and Zoll (2005), among others. Most of the studies that relate to nominal and verbal reduplication attempt to find formal mechanisms for describing the pattern of the said reduplicative constructions, thereby assumed, in theoretical terms, that reduplication should be regarded as a single phenomenon wherever it occurs and in whatever form (Newman 1989).

2.6.1 Reduplication in Hausa nominal and verbal formation

This section reviewed works on the influence of reduplication in the formation of Hausa nominal and verbal forms where it focuses mainly on partial reduplicative process. It is widely established in the literature that partial reduplication is a morphological process that is well attested in the grammatical system of Hausa grammar, which is employed frequently in the formation of nominal plurality and pluractional verbs (Newman 2000; Inkelas and Zoll 2005). As mentioned earlier in the preceding discussion, the most active form of reduplication in this manner is actually the partial reduplication which is equally affirmed to be the most productive reduplicative process in the nominal and verbal reduplication of the language. Basically, partial reduplication is the kind of operation found in the plurality of nouns and adjectives and, in the same way, in verb pluractionality and other verbal formation with certain level of phonological assimilation or modification attested therein.

2.6.1.1 Reduplication in Hausa nominal formation

Reduplication in Hausa affects the formation of nominal words (which comprises of nouns and adjectives), where the reduplicative patterns mostly involve the operation of partial reduplication. The complexity of nominal pluralisation in Hausa is very obvious such that a lot of scholars worked on the phenomenon using different analytic approaches. The most famous work on the nature of this complexity is that of Newman (2000), who identified several different ways to form nominal (noun and

adjective) plurals in Hausa, many of which involve partial reduplication. For the purpose of the current research, the focus is mainly on that aspect of pluralisation that involves reduplication. Thus, consider the following example extracted from Newman (2000, pp. 450-452):

17. <i>Singular form</i>	<i>Plural form</i>	<i>Gloss</i>
i. gárdàmà:	gárdàndámí:	‘dispute’
ii. ?ámárjá	?ámàrmárí:	‘bride’
iii. fǎ:wàrà:	fǎ:wàrwárí:	‘advice/counsel’

Looking at the forms in 17(i-iii), it is obvious that reduplication plays a role in the formation of the plural nouns – albeit the process encompasses some other complex operations. But the fact is that in some situations Hausa has a rule of forming plurals of a certain class of nouns by partial reduplication, in which the rule usually occurs concurrently with another phonological rule of palatalisation which, at the surface level change the coronal obstruents into palato-alveolars before front vowels. Examples: *gídá:* (sg) → *gídàǰé:* (pl) ‘house’; *kásá:* (sg) → *kásàfé:* (pl) ‘country’. This is in conformity with the general rule of palatalisation that is very common in Hausa which postulates that the obstruents [s, z, t and d] change to [ʃ, tʃ, dʒ and dʒ], respectively, when occurring before front vowels [ɪ and e]. Ideally, when the plurality of nouns (and sometimes adjectives) is resulted via partial reduplication, the plural suffix usually contains a copy of a consonant of the base as indicated in the following example:

18. <i>Underlying form</i>	<i>Reduplicated form</i>	<i>Gloss</i>
i. tá:gà: → tá:gó:gí:		‘windows’
ii. wá:kà: → wá:kó:kí:		‘songs’
iii. ró:bà: → ró:bó:bí:		‘plastic robbers’

Considering the forms in 18, it is very clear that the plural formation is resulted in the way it appears and the plural suffix usually contains a copy of a consonant of the base.

In a relatively converse perspective, it is unarguably clear that partial form of reduplication in Hausa can be useful in the formation of nominal plurality (particularly in such situations where the suffixes contain a copied consonant). However, the general conception about the whole situation is that the process of full reduplication is not a typical operation in the formation of nominal plurality in Hausa. Even in such instances where full reduplication affects nouns or adjectives, it is essentially used to express other forms of meanings, which consequently shows a sense of distribution, taxonomy as well as that of frequentatives. Consider the following example:

19.	<i>Reduplicated forms</i>	<i>Gloss</i>
	i. ló:kàtʃí:-ló:kàtʃí:	‘from time to time’
	ii. wúrí:-wúrí:	‘place to place’
	iii. sá:ʃè-sá:ʃè	‘part by part’

The form in (19i) shows a sense of time distribution not plurality and the form in (19ii) equally shows a sense of distribution, but the one in (19iii), on the contrary, shows a sense of taxonomy.

The process of nominal derivation in Hausa is not only restricted to lexical nouns, but also adjectives which are basically derived from the verb forms to form participial morphosyntactic forms. Obviously, the formation of these kind of adjectives is done through the process of reduplication thereby morphologically behave in exactly the same way the nouns do in respect of agreement (number and gender) with the nouns they modify. The phenomenon of adjectival derivation is well addressed in Newman (2000) under the concept of ‘phonological duplication’ in the nominal construction which basically involves the participial derived adjectives. According to Newman (2000, p. 19), the nature of phonological operation in the formation of participle constructions of the derived adjectives in Hausa is such that largely involves a bisyllabic-type suffix (-aCCe:); whose medial consonant is supplied through copying of the final consonant of the stem. He further adds that the second syllable of the participial suffix usually has a front vowel ([e:]), and that when the stem final consonant is a coronal it then automatically becomes palatalised before front vowels.

Based on the above position, the phonological operation that usually affects those constructions is such that a copied final consonant of the stem becomes internally palatalised to the participial suffixal high vowel. This is shown in the forms that appear in the following example; where the adjective forms are derived from the verb forms:

20.	<i>Verb form</i>	<i>Derived adjective</i>	<i>Gloss</i>
	i. kàsà: (kasa) → kàsáʃʃé: (kasasshe)	‘to make heaps of things’	
	ii. gàsà: (gasa) → gàsáʃʃé: (gasasshe)	‘to roast’	
	iii. tʃánzà: (canza) → tʃánzádzé: (canzajje)	‘to change’	
	iv. dákà: (daka) → dákákké: (dakakke)	‘to pound’	

The forms in 20 above show consistent patterns of adjectival derivation from the stem verb forms (ignore the change in the tone patterns). Adopting the position of Newman (2000), it is clear that the derivation process that resulted in the formation of the above deverbalised participial adjectives can simply be captured in this formulation; {XCV →

XC–aCCe:}, which according to Wilbur (1973) and Inkelas & Zoll (2005), is a clear instance of what they refer to as ‘back-copying’. In the same vein, Newman (2000, p. 419) confirms this position where he posits that “the effect of palatalisation in the derivation of participial adjectives in Hausa can occasionally extend to the final consonant of the stem thereby result in the over-application of palatalisation”. In view of this, two methods are identified in the literature for duplicating materials, namely; ‘morphological reduplication’, which is basically analyzed in respect of element doubling and; ‘phonological duplication’, which is best analyzed as feature spreading or segmental internal agreement.

2.6.1.2 Reduplication in Hausa verbal formation

This section focuses on the phenomenon of reduplication that systematically relates to verbal formation in Hausa where it dwells on the nature of partial reduplication in the pluractional verb forms in the language. The concept of ‘pluractional verb’ specifies that verbal action is characterized by one or another kind of multiplicity, which can either be described habitually or be executed by a number of subjects which can in turn apply to certain number of objects (Gerhardt 1984). This conforms to the situation in Hausa where pluractional verbs have been described as involving one subject or a number of subjects doing the same thing to a number of objects, either simultaneously or in succession (Newman 2004). The formation of verb forms in Hausa is achieved through the process of morphological reduplication (especially the incomplete type) with certain conditional phonological operations that take place concurrently.

Morphologically, the formation of pluractional verbs (as view in the literature) involves a widespread and productive building of verbs forms which a lot of scholars refer to as ‘intensives’ (Al-Hassan 1983; Gouffe 1975b; Pawlak 1975; Newman 1987, 1990 and 2000). In a related conception, Newman (1989) posits that pluractional verbs in Hausa are formed by reduplication from a simple verb stems through a derivational process. According to him, “based on diachronic or historical consideration, the process consisted in reduplicating the two right-most syllables of the verb with concomitant deletion of the original stem-final vowel”. On the other hand, based on the synchronic consideration, “most verbs form pluractional by reduplicating the initial CVC- of the stem, where the C₁ assimilates the following abutting consonant or undergoes rhoticization”. The patterns of pluractional verbs appear in form of reduplicated forms

and often built on verb stems (both simple and derived). They also involve all grades of verbs and in almost all cases they retain all morphosyntactic properties in the larger units of construction, such as ‘verbal nouns’ and ‘imperative formation’, which are often associated with the grade in question. Semantically, they usually express complex multiple actions performed on a number of occasions by either a plurality of subjects and/or the plurality of objects.

Apart from the foregoing viewpoint on pluractional verb forms in Hausa, Newman (2000) further posits that pluractionality in verbs involves a very productive derivational process in the formation of the targeted verb forms, where he adds that pluractional verbs are not used frequently and are generally unique in nature. Impliedly, pluractional verbs in Hausa are derived from the corresponding non-pluractional verbs through the process of partial reduplication. In this reduplicative process, two ways of forming the forms of the verbs are attested in the literature (Newman 1989, 2000), namely; prefixal reduplication and infixal reduplicative (–CVC–). But based on the general operations in the formation of pluractional verbs in Hausa, the most productive way is the one that involves the said prefixal reduplication. According to Newman (2000), infixal reduplicative pluractional verbs, even though are not very common in the language, “they occur occasionally as morphosyntactic strings”. Their formation is usually done through the use of infixal reduplicative –CVC in the penultimate position which is often followed by rhoticization of the penultimate onset obstruent, as shown in the following example:

21. i. táɸàsà → tá**ɸá**rɸàsà ‘to boil’
 ii. rúgùzà → rú**gú**rgùzà ‘to destroy’

Moreover, it was pointed out that the most common and productive pluractional formation is that which involve the prefixal reduplication, which usually appears in twofold: the first category involves the consonant of the stem, followed by a vowel and a geminate consonant (CVG–), where the vowel normally undergoes certain phonological adjustment of shortening at underlying level, and also when the coda consonant is obstruent in nature; the second category of prefixal reduplication does not involve the germination of consonant in the coda position when the consonant is phonetically sonorant. Consider the forms in the following example:

22. a. Prefixal reduplication with Geminate

- i. tá:kà → táttàkà ‘to step on something repeatedly’
- ii. dákà: → dáddàkà ‘to pound repeatedly’
- iii. dásà → dáddàsà ‘to transplant severally’

b. Prefixal reduplication without Geminate

- i. kírà: → kír kírà: ‘to call repeatedly’
- ii. kírà → kír kírà: ‘to invent or create (something)’
- iii. kàntfè → kán kàntfè ‘become small’

Considering the forms in the above example (22), it is obvious that the forms in the first category involve consonant germination if the prefixal reduplicative process is applied, while those in the second category appear without such germination. The nature of partial reduplicative patterns of the forms in the above example (22) can be best described as what Newman (2000) calls ‘active’ and/or ‘frozen’ partial reduplication. Thus, according to him, “an active reduplication is a synchronically recognizable derivational or inflectional process, which is more or less productive in nature, as shown in 22(i-ii); while the ‘frozen’ (or vestigial) reduplication refers to forms that are phonologically reduplicated but which from a synchronic point of view are essentially not analyzable”. Simply put, pluractional verbs that are said to be frozen in Hausa are extremely common and they usually undergo synchronically productive process of verbal formation in the system of the language as indicated in the following set of data:

- 23.
- i. sán-sàná: (cf. sana) ‘smell’
 - ii. sás-sàbè: (cf. sabe) ‘to clear a farm’
 - iii. báb-bàkà: (cf. baka) ‘to grill’
 - iv. gír-gìzà: (cf. giza) ‘to shake’

The pattern of reduplication in the pluractional forms in (23) above indicates that the actual stem of the reduplicative forms does not exist substantially as an independent verb in the system. Similarly, the phonological operations that occur in the reduplication process involve both assimilation and rhoticization.

2.7 Previous studies on assimilation in Hausa reduplicative morphology

Several researches were carried out in the area of Hausa reduplicative morphology, particularly those works that relate to the phenomenon of phonology-morphology interface (Gouffe 1975 and Newman 1986). This section essentially focuses on reviewing those aspects of literature that relate to such phonological influence in the reduplicative formation of pluractional verbs, especially those issues

that have to do with assimilatory operation in the reduplication process of the targeted verb forms and reduplicated nominal morphosyntactic strings in Hausa.

2.7.1 Studies on phonological modification in Hausa Reduplicated Nouns

One of the most cited literature materials on Hausa reduplicated nouns is the famous work of Gouffe (1975) who published an article titled ‘*Redoublement et Reduplication en Haoussa: forms et fonctions*’, where he suggests that the system of Hausa nominal reduplication demonstrates an obvious involvement of the prefixation of CVC- sequence. According to him, “the nature of the prefixal attachment involves both copying of the initial CVC element of the base as well as assimilation of the base (coda) consonant”. This is demonstrated in the following example:

24. i. kàr.kárɸá: → kàk.kárɸá:
 ii. zàɸ.záɸá: → zaz.zaɸa:

Similarly, prior to the publication of Newman’s monumental encyclopedic reference grammar of Hausa (Newman 2000), Newman (1986) provides some analyses in respect of what he calls ‘segmental modifications’ in reduplicated nouns in Hausa which, to a large extent, exhibit partial form of reduplication. He identifies four kinds of segmental medication which are basically governed by different phonological rules and processes. The first modification is that which involves vowel reduction as shown in the following example:

25. i. báámíí → bámbáámíí ‘upper part of palm’
 ii. kúúkíí → kúkkúúkíí ‘a gum tree’

As can be seen in 25, the reduplicated CVC is a copy of the stem CVC but with a reduced vowel due to an automatic synchronically active rule that changes the long vowel to short as shown in the rule: $VV \rightarrow V/_CS$ (this rule implies that a long vowel becomes short in a closed syllable).

Furthermore, the second modification identified by Newman (1986) in the formation of reduplicated nouns is vowel shift. According to him, if the stem vowel is either /e/ or /o/, it changes automatically to /a/ in the reduplicant-CVC as in 26:

26. i. dóókáá → dóóddóókáá → dáddóókáá ‘waterbuck’
 ii. béélàà → béélbéélàà → bálbéélàà ‘catle egret’

The rule that results in the kind of modification in 26 applies after the first rule in the modification process must have applied. Thus, the rule is stated as: $/e, o/ \rightarrow a/_CS$ which implies a vowel shift. Furthermore, Newman (1986) identified the third possible

segmental modification in the reduplicated nouns which results in the change of the stem-coda alveolar obstruent (/t, d/) to a roll approximant /r̄/, in what he considers as ‘rhoticization’. This is shown in the following data:

27. i. kúdú → kúdkúdú → kúrkúdú ‘sandhopper’
 ii. yááfi → yádyááfi → yaŕyaafi ‘a twinner’
 iii. kwáásá → kwáskwáásá → kwáŕkwáásá ‘drive ant’

The rule that applies to the forms in 27 is demonstrated in the following way:

$t \rightarrow r̄ / _ C\#$ - this implies that any stem-coda alveolar obstruent becomes rhoticised in the context of reduplicant-CVC.

The fourth segmental modification in Newman’s (1986) analysis is that which directly involves consonant-vowel assimilation in form of palatalisation. In this kind of modification, if the stem-coda of the reduplicated noun is an alveolar obstruent (/t, /s/, /z/) followed by a front high or mid vowel (/i/, /e/), the alveolar sounds automatically becomes palatalised through anticipatory assimilation. Consider the data below³⁸:

28. i. ké:t-ì: → kéké:t-ì: → k^jáŕké:tʃi: ‘wild dog’
 ii. kás-í: → káskás-í: → káfkáʃí: ‘an herb’
 iii. báz-è: → bázbáz-è: → báŕbádzèè ‘biting ant’

Newman states the rule that applies to this kind of modification as follows:

$/t, s, z/ \rightarrow /tʃ, ʃ, dz/ / _ \{i, e\}\#$

The four rules in Newman (1986)’s analysis that apply to segmental modification in the Hausa reduplicated nouns are summarized below, with the respective phonological processes:

- i. VV → V/ _C# - Vowel length reduction
 ii. /e, o/ → a/ _C# - Vowel shift
 iii. t → r̄/ _C\$ - Rhoticization
 iv. /t, s, z/ → /tʃ, ʃ, dz/ / _ \{i, e\}\# - Palatalisation

It should be noted that the above rules and processes that trigger phonological modifications in the reduplicated nouns are only applicable in describing partial assimilation in relation to the form of reduplication. However, Newman (1986) affirms that total assimilation is equally attested in the formation of reduplicated nouns, which he considers as a process of ‘gemination’. According to him, “under this operation a

³⁸ Note: the process of rhoticization affecting the coda CVC obstruent is not directly relevant to the nature of modification in this transformation process.

labial, alveolar or velar obstruent completely assimilate to the following abutting consonant within the lexical boundaries” as shown in the following data³⁹:

29. i. gáφgááfá → gággááfá ‘an axe’
 ii. zàbzàbíí → zàzzàbíí ‘fever’
 iii. dákdóókáá → dádddóókáá ‘waterbuck’

The following rule is posited by Newman (1986) to capture the nature of assimilation in reduplicated nouns in (29) above: $P/T/K \rightarrow C_{\alpha}/_ C_{\alpha}\#$ (where P refers to labial, T refers to alveolar and K refers to velar). Further, Newman declares that this rule seems to be a property of only reduplicated noun forms in Hausa, rather than being a general phonological rule.

Although Gouffe (1975) and Newman (1986) succeeded in analysing the nature of segmental modification in the reduplicated nouns of Hausa using some relevant rules and processes, his analytic approach failed to capture, in detail, the nature of phonological assimilation particularly segmental assimilation in the forms under consideration. As can be noticed in the preceding data and analyses provided, the most central operation therein is the phenomenon of segmental assimilation, which impliedly cut across all the processes that are involved in the modification. Going by the analyses provided, there are certain fundamental facts about the process of assimilation (especially as it’s relates to the process of reduplication) that are conspicuously left out, or remained unaddressed in the analysis. For instance, the analyses fail to specify the parameters of assimilation, which constitute the defining the ‘assimilating feature(s)’, ‘the targeted structure’ as well as the ‘domain of operation’. In addition, the analyses provided fail to explicate the nature of triggers, transparency and the direction of assimilation in the context of the type of operation in the Hausa reduplicated nouns.

2.7.2 Studies on phonological modification in Hausa Pluractional Verbs

The most detailed and comprehensive study of verb pluractionality in Hausa is Souckova (2011). However, the central focus in Souckova’s analysis is not quite in relation to phonology-morphology connectivity; it’s more or less a morpho-syntactic analysis where it particularly focused on the analysis of semantics of the pluractional verbs. In view of this, Souckava’s work may not be directly relevant to the essential interface issues that underpin the current research attempt.

³⁹ These forms are typical words of ‘Sakkwatanci’ dialect found in Western Hausa, specifically in some parts of old Sokoto.

In respect of the current research attempt, the focal point in the literature of verb pluractionality relevant to this research will largely be based on the work of Newman (2000) who provided a surface descriptive analysis of the nature of assimilation in the ‘active’ and ‘frozen’ pluractional verbs in Hausa - the terms which were reportedly first used in Newman (1986a and 1989a). Based on his position, Newman (2000) affirms that “pluractional formation in Hausa is a very productive derivational process which systematically applies to verbs of all grades”. Accordingly, verbs that are so-called pluractional are derived from the corresponding non-pluractional verbs by partial reduplication, and in the same way, prefixal reduplication is said to be the most productive way in forming them in Hausa. Newman (2000) further posits that the pluractional verbs indicate “multiple, iterative, frequentative, distributive or extensive action in Hausa”. Consider the data shown in 30 below:

30. a. *Active pluractional verbs*

- | | | | | |
|------|--------|---|----------|-----------------------------------|
| i. | ϕìt-á: | → | ϕìϕϕitá: | ‘went out’ (one-by-one) |
| ii. | ùll-ó | → | ùùlló | ‘to appear suddenly’ (in numbers) |
| iii. | mík-è: | → | mímmíkè: | ‘to spawl out all over’ |
| iv. | káf-è | → | kákkáfè | ‘killed a lot’ |

b. *Frozen pluractional verbs*

- | | | | | |
|-----|-------|---|---------|-----------------|
| i. | bàk-è | → | bábbàkè | ‘to grill/burn’ |
| ii. | fàr-è | → | fámfàrè | ‘to fall out’ |

Considering the data above (30), Newman (2000) provides some descriptive analyses of the formation of pluractional verbs, where he pointed out that the said pluractional forms are formed by prefixal reduplication in which case the CVC of the stem is being copied retrogressively. Similarly, in the process of that operation, the final consonant of the reduplicated element becomes automatically assimilated to the abutting consonant with completeness (in the case of active pluractional verbs), and either totally or partially assimilated in that way (in the case of frozen pluractionals).

Apart from this explanatory description, Newman (2000) did not suggest or propose any phonological rule(s) to formally capture the nature of operation in the formation of the kind of pluractional forms in 30. It is therefore noted that there is a noticeable gap in the analysis of assimilation offered by Newman in respect of pluractional verbs in Hausa which largely has to do with its failure to provide lucid and in-depth analyses of the nature of assimilatory operation in the reduplication process of the verb forms under consideration. The analysis therefore appears to be surface,

inadequate and as such fails to account for the synchronic nature of the observable segmental assimilatory operations in an explicit way such that ‘triggers’ and ‘targets’ features become clearly spelt-out.

2.8 Theoretical framework: Autosegmental Theory

This section is designed to explicate the central tenets of Autosegmental Phonology and its theoretical orientation in relation to the current research. The subsections that follow focus on explanations of the basic workability as well as the application possibilities of the theory in handling the data analysis that pertain to nominal and verbal reduplicative formation in the Hausa language. Precisely, the applicability of the theory in dealing with issues that relate to segmental assimilation occurring within the reduplicative processes that naturally result in the formation of reduplicated nouns and pluractional verbs in Hausa.

2.8.1 An overview of Autosegmental Theory

This research employed Autosegmental Phonology as a theoretical framework used in the analysis of phonology-morphology interface that specifically relates to assimilatory operation in the reduplicative formation of nominal and verbal morphosyntactic forms in Hausa. According to Devenport and Hannah (2011), the term ‘autosegmental’ is derived from the notion of autonomous segment which impliedly refers to the relative independence of features that may be linked to a timing slot and occupy a separate tier in their representation. The theory was first proposed by Goldsmith (1976) and later advanced by Clement (1976), Clement & Keyser (1983) and Hayes (1986) to handle the representation of tonal and other suprasegmental phenomena. The general scholarly assumption with respect to this framework is that features are treated as autosegments in that they reside on individual tiers and behave independently of their respective segments such that one feature may be associated with more than one slot, and analogously, more than one feature may be associated with a single slot. This is actually in line with the earlier assertion by Goldsmith (1976) that “autosegments constitute an independent conceptually equal tier of phonological representation, with both tiers realized simultaneously”. Similarly, lot of scholars within the parlance of phonology have generally accepted the fundamental insights of Autosegmental Theory which clearly postulates that certain features are semi-autonomous from each other, and from their anchors (such as ‘tone’ vs ‘tone-bearing-

unit') which are usually represented on separate tiers (Goldsmith 1976a and b; Pulleyblank 1986, 1989).

Ideally, the model of Autosegmental Theory flourished as an offshoot of generative phonology that was based on ideas emanated from the conception of early linguists (such as Block 1948; Firth 1948 and Hockett 1955). In view of this, Fromkin (1972) posits that any theory within the parlance of generative phonology must be able “to establish formal and substantial definitions of the phonological components of grammar which will specify all and only the set of possible sound systems of human language”. The main thrust in the classical generative theoretical model of phonology (also known as SPE-type model advanced by Chomsky and Halle 1968), is the idea that segments are arranged in a linear order and their representation is in form of linear sequence of feature matrices. The SPE introduced a representational model of distinctive features which are entirely associated with single segments, and those features are assumed to be properties of single segments, and segments are in that way ordered linearly by a rule-governed system (Youssef 2006). Although in his recent publication, Leben (2017) claims that the proposal of Autosegmental Theory by the earlier scholars was said to be late to generative phonology, he affirms that suprasegmental phenomena had been tackled much earlier in American structuralism (see Harris 1944 and Halle 1958).

In conformity with Goldsmith's position on Autosegmental Theory, Shih and Inkelas (2017) summarized Autosegmental Phonology as a theory which embodies two central claims, namely:

- i. Features exist autonomously, each on its own independent tier, organized by a central timing skeleton; and
- ii. The association between elements on feature tiers and elements on timing tier can be one-to-one, one-to-many, many-to-one or even zero-to-one in the case of floating features or features in underspecified timing units.

Meanwhile, as affirmed by Goldsmith (1976), the central conception in the theorization of Autosegmental Phonology recognises three fundamental operational conditions that are basically considered in the representation of autosegmental elements as listed below:

- i. The idea of Well-Formedness Condition (WFC)
- ii. The idea of Association Principle in autosegmental representation
- iii. The notion of Obligatory Contour Principle (OCP)

But the central assumption in the proposal of the theory itself subsequently raised some issues that needed more scholarly clarification. In respect of this, Hyman (2014) raised some fundamental issues in form of questions that are systematically attributed to the model of Autosegmental Theory:

- i. How appropriate/effective are traditional Autosegmental Representations?
- ii. What insights does Autosegmental Representation (AR) help to express?
- iii. Where does Autosegmental Representations (AR) fall short?

These questions were raised with the aim of addressing some fundamental issues conceived in the proposal of the traditional autosegmental phonology (Goldsmith 1976a, b; Pulleyblank 1986 and 1989). In the said proposal, the basic autosegmental insight is the assumption that certain features in phonological systems are semi-autonomous from each other and from their anchors (such as tones vs tone-bearing-units) which are equally represented on separate tiers. Moreover, the attempt also led to the realization of certain cardinal properties of the classical Autosegmental Theory of phonology which Jurget (2011, p. 24) considered as conceptual properties of the theory in handling issues that have to do with segmental assimilatory operation, especially with regard to its occurrence within the morphological operations. Thus, the conceptual properties are listed below:

- i. Feature-spreading mechanism in autosegmental representation.
- ii. Conceptual notion of ‘trigger’, ‘target’ and ‘transparent’ segments.
- iii. Principle of No-line crossing in feature-spreading.
- iv. Branching in the representation of successive identical elements.
- v. Conceptual notion of ‘headedness’, ‘binarity’ and ‘recursiveness’.

These properties are equally considered by Hyman (2014, p. 13) as the five central assumptions in autosegmental spreading mechanism.

It should be made clear at this point that the theoretical conception of Autosegmental Phonology had in the early and mid 1970s received serious scholarly condemnation, essentially attributed to the fact that some features (like tone or nasality) are taken to be independent of single segments. This actually implies that those features may be related to multiple segments, such as the case of *affricates* in English and *pre-nasalized stops* in Fulfulde (see Devenport and Hannah (2011, p. 591) for details on this). Another theoretical puzzle which confronted the linear generative theories of phonology (SPE-Type) was the actual contention on how to resolve numerous contradictions in phonological features. The paradox is that, sometimes some features

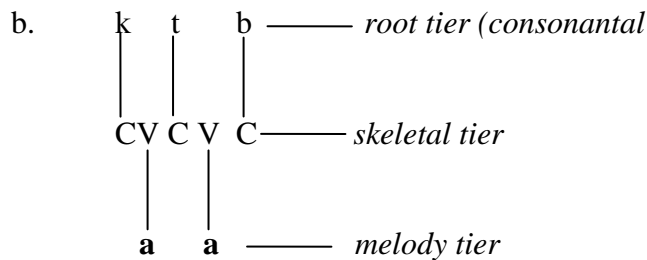
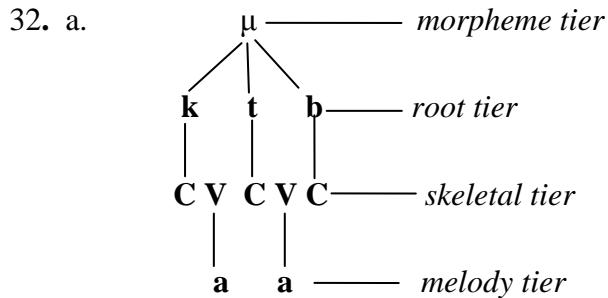
behave as though they are inherently part of the segments distinguished from those that are said to be non-segmentally inherent features, and at other times they behave as though they are two contrastive segments – this has no doubt posed serious concern in the scholarship of phonological theories. Essentially, these contradictory issues have been discussed extensively in Devenport and Hannah (2011) who further claim that “phonological representation should be characterized as being linear if it is such that reference can only be made to the particular linear sequence or string of feature specification and boundaries that make up the environment for a particular phonological process”, which also indicates the fact that rules can only be referential to linear sequence of segments. It should, however, be considered that while there are quite number of phonological operations that can be expressed adequately in terms of linear order or adjacency, there are also many processes which either cannot be captured purely by reference to string/adjacent elements, or for which any such linear rule is not insightful – such that the linear information cannot be adequately handled.

2.8.2 Theoretical insights of Autosegmental Theory in morphological formation

After the initial proposal of Autosegmental Theory by Goldsmith and Clements in the period between 1976 and 1979, the theoretical conception of the theory subsequently witnessed extensive advancement especially in consideration of its potential applicability in handling phonological issues in morphological formations. In line with this, McCarthy (1979) built upon the theory extensively in the verbal derivation of classical Arabic, where he proposed an important development by showing that the derivation process of words building from consonantal roots⁴⁰ in the language could be analyzed autosegmentally. In addition, the consonantal roots operate in such a way that the particular intervening vowels and their placement determine whether the final word is a verb or noun and which verbal or nominal category it belongs. Based on McCarthy’s (1979) findings, “Arabic exhibits a situation whereby words may be formed by modifying the root internally (where the root constitutes consonantal stem, such as **ktb**; ‘write’), and not by affixation, reduplication or compounding”. Consider the verb forms in 31 and their autosegmental templatic representation in 32:

⁴⁰Napoli (1996) refers to this type of roots as ‘triliteral roots’ (consisting of three consonants) or to be more specific, ‘consonantal root’, which she also claims that they never occur freely without being accompanied by interspersed vowels.

31. i. katab 'he wrote'
 ii. kattabu 'he cause to write'
 iii. Kutiba 'it was written'
 iv. ka:taba 'he correspond'



In the autosegmental representation of the consonantal root template in 32, McCarthy (1979) posits that the description of autosegmental framework is such that each autosegmental tier contains a linearly ordered sequence of autosegments, where different features may be placed on separate tiers and various tiers are organized by association lines. It is therefore confirmed that in line with McCarthy's proposal, Arabic patterns and roots are quite relevant in the application of Autosegmental Theory and they show instances in which feature bundles for vowels and consonants are systematically connected to **C** and **V** nodes on different tiers. In essence, McCarthy (1979) affirms that "the *root tier* constitutes the consonantal segment while the 'skeletal tier' has been described a prosodic template which is associated with a particular meaning. In the same way, 'melody tier' involves grammatical information such as tense, voice, aspect and number derivational functions, and the 'morpheme tier' is a node which indicates the lexical representation of each morpheme".

McCarthy's work on Arabic verbal derivation proves that Autosegmental Theory is not only a framework used in handling the phenomenon of prosodic features in the formalization of generative phonology as initially proposed by Goldsmith (1976). Noticeably, it is obvious that the theory has been widely extended to accommodate issues that pertain to segmental and morphological processes like

assimilation and reduplication cross-linguistically (see McCarthy (1993) for details on this). In respect of this interface phenomenon that is attested across languages, Marantz's (1982) work has been generally considered as the most prominent work on reduplication that is deeply inclined with autosegmental theoretical formulations. His work has considerably flourished the literature on phonology-morphology interconnectivity in reduplication system. Following McCarthy's (1979 and 1981) proposal on CV skeleton, Marantz (1982) equally posits that each process of reduplication can be described in terms a skeleton thereby often realized as reduplicating morpheme⁴¹ which he termed as 'skeleton affix'⁴². Accordingly, reduplicative morphemes are templates which are segmentally empty phonological objects that are affixed to a stem and they must be given segmental contents. McCarthy (1981) postulates that templates are composed of skeletal slots (C and V), which has later been formalized in 1986 in his famous publication titled "Prosodic Morphology Hypothesis" (PMH) where the said templates are defined in terms of the authentic units of prosody. This, of course, is a phenomenon that is quite similar to what Goldsmith (1976)'s opined in respect of Autosegmental Phonology where different phonological content is expressed on different tiers of representation.

Marantz (1982) further views reduplication, especially the incomplete type, as a process that is simply conceived as the affixation⁴³ of skeleton to a stem which naturally occurs in form of prefixation, infixation and suffixation thereby used for a variety of derivational and inflectional purposes. Relatedly, in his scholarly investigation on reduplicative patterns and operations in Fanqie languages, Zhiming (1990) reveals that a close survey in the literature on reduplication confirms that a lot of scholars view partial reduplication as affixation process. This conception has received much attention especially within the framework of Autosegmental Theory where the nature of copying has remained a focal point (see, particularly, Yip 1982, Clements 1985, Browslow and McCarthy 1983 and McCarthy & Prince 1986). In view of this, Marantz (1982, p. 6) reported reduplicative operations in Agta and Chukchee languages where a CVC reduplicative copying mechanism synchronically prefixes a

⁴¹ In view of this, Marantz (1982) suggests that any theory of morphology that claims to be adequate will need some mechanism to effect the copying of an entire morpheme to the stem.

⁴² In Marantz's (1982) theory, this is referred to as 'CV Skeleta' while in McCarthy and Prince's (1986) theory it is termed 'prosodic unit'.

⁴³ Marantz (1982) made further clarification of his viewpoint on reduplication that reduplication rules look completely like affixation process, except that the material attached to the stem resembles the stem phonologically.

copy of the first CVC of a stem to the stem (in the case of Agta), and suffixes same stem CVC copy to the stem (in the case of Chukchee). This process exhibits plurality and the degree of singularity in the two languages, respectively. Similarly, the nature of reduplicative operation demonstrated in the data systematically results in the formation of partial reduplicated elements which appears quite identical with the type of Hausa partial reduplicative system. As extracted from Marantz (1982, pp. 6 and 13), the data in the two cited languages and their autosegmental analytic representations are demonstrated in 33 and 34:

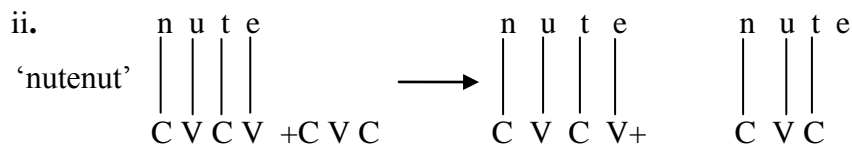
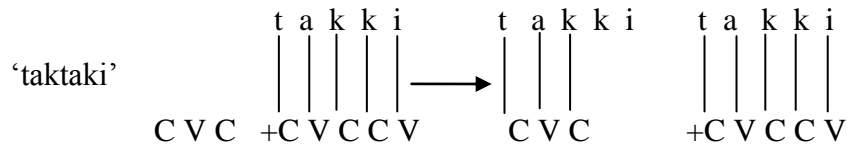
33. i. **Agta**

bari	‘body’	→	barbari-k-kid-in	‘my whole body’
mag saddu	‘leak’	→	mag sadsaddu	‘leak in many places’
na-wakay	‘lost’	→	na-wakwakay	‘many things lost’
takki	‘leg’	→	taktakki	‘legs’

ii. **Chukchee**

jil?e	‘gopher’	→	jil?e-jil	‘absolute singular’
nute	‘earth ground’	→	nute-nut	‘absolute singular’

34. i.



As can be seen in the data (in 33a & b) and its analytic representations (in 34a & b), Marantz’s autosegmental analytic approach shows that the two languages exhibit a case of partial reduplication at prefixal and suffixal positions, respectively. Also, the analyses show that apart from the morphological operation that results in the reduplicative formation of the forms in the languages, there is no evidence of serious phonological operation therein, either simultaneously with the morphological process or in a separate way – except that some segments in the input form become deleted in their corresponding output realizations. As indicated in the representations in 31, Marantz’s position is that the analysis of partial reduplication using Autosegmental

most instances, the process of Hausa reduplication that systematically results in the formation of nominal and verbal forms, tends to interface with aspects of phonological process particularly segmental assimilation that involves sequences of obstruent and sonorant consonants. In addition, conceptual issues in Autosegment theory were highlighted and discussed extensively to justify the applicability of the theory in handling the nature assimilation-reduplication interface in the language under study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses methodological description of the current study. This includes the research design, sampling techniques and the various procedural methods used in the collection of data in the field. Two major sources of data elicitation are employed in this study. They are: primary and secondary sources. The set of data elicited during the field work is restricted to Hausa nominal and verbal reduplicated morphosyntactic forms.

3.2 Research design

The current study employed a descriptive design and the procedure of its data collection was designed with the aim of ensuring that accurate and authentic data of nominal and verbal morphosyntactic forms in Hausa were vigorously elicited from the core native speakers of the language. In the process of data elicitation, the study considered the use of both primary and secondary sources of data. The data comprises of only reduplicated nouns, deverbalised adjectives and pluractional verbs that specifically involved assimilatory operations in their reduplicative formation. The data of the said morphosyntactic forms in the language exhibit the tendency of segmental assimilation (both total and partial) involving sequences of consonant-consonant and consonant-vowel segments. Both the primary and secondary data were subjected to morpho-phonological analysis that clearly demonstrated the occurrences of segmental assimilatory operations in terms of feature spreading using the theoretic model of Autosegmental Theory.

3.2.1 Primary data

Essentially, the primary data was based on the fieldwork conducted in the major core Hausa cities⁴⁶ in the northern Nigeria where Hausa is predominantly used by inhabitants who are largely the competent native speakers of the language. The majority of the identified speakers use Hausa as their first language, although few of them use other languages secondarily. The reason for choosing these places for the data elicitation was strictly based on consideration that they represent major Hausa dialects which jointly formed the so-called standard Hausa. The informants were selected from different social groups representing the Hausa native speakers within the sampled areas. They include: farmers, traders, students and Hausa musicians (who were found practicing at places of traditional festivities).

3.2.1.1 Sample and sampling technique

The target sampled native speakers used in this research were both male and female who constituted educated, semi-educated and non-educated users of the language and their age ranged between 20 and 60. The primary data was elicited from spontaneous free-flowing utterances by means of recording, which was carried out through a purposive sampling technique. Naturally free-flowing speeches of the target Hausa native speakers were recorded as they used the language in the contexts of nominal and verbal reduplication which considerably involved issues that pertain to phonology-morphology interface. In the process of doing that, I engaged in recording of unstructured free-flowing speeches from oral narratives for a total period of one and half hours where 45 informants were sampled, with 15 speakers from each of the three Hausa dialects. These informants were identified and authenticated as real native speakers of the language and, in that process, a period of 3 minutes was allotted per each of the informant. This was achieved with aid of an audio recorder and mini-mic. In a similar perspective, data was equally elicited from popular Hausa singers (like Alhaji Mamman Shata, Alhaji Gambu mai Wakar Barayi, Alhaji Sani Sabulu and Alhaji Aminu Alan Waka) and some festive songs at selected places of traditional festivities. Their song utterances were observed and recorded thereby paying attention to how they were actually pronouncing the target morphosyntactic strings that constitute assimilation-reduplication interface.

⁴⁶ These cities were classified by Ahmad and Daura (1970) as regional domains of Hausa dialects. They include Kano, Sokoto and Katsina. Specifically, the identified cities were covered in the research for the purposes of representation rather than exhaustiveness.

In the same vein, the secondary data were semi-structured in nature where 20 paradigms of reduplicative constructions containing instances of Hausa ‘reduplicated nouns’ and ‘pluractional verbs’ were presented to the informants for them to read aloud while being recorded using the same recording instruments. In all instances of personal interaction with the informants, all the informants were authenticated and ensured that they are original native speakers of Hausa.

3.2.1.2 Tools for the data analysis

The data was thoroughly scrutinized for the preliminary stage analysis using the e-lan tool which clearly spelt-out the actual number of phonemes and the phonetic variants of some phonemes in the elicited data. The Elan tool was used to enable the accuracy in the phonemic (as opposed to orthographic) transcription and also in the annotation of the data.

3.3 Secondary data

The secondary data were sourced from written reference materials in form of scholarly books and publications. Largely, these materials were consulted in the libraries, and some of them were sourced from the internet. Prominent among the works used as general guide materials include the early works of classical Hausa grammar by Abraham (1941) and Greenberg (1941). Although the aforementioned materials consulted for the purpose of this research were partly based on archive materials on Hausa grammar, the focus was mainly on those structures that are still in contemporary Hausa usage. Meanwhile, in furtherance to the process of the secondary data source, the focus was shifted to consulting some relatively recent materials in the parlance of Hausa grammatical studies. These include the most reliable influential reference materials; Newman’s (2000) ‘*Encyclopedic Reference Grammar of Hausa*’ and Jaggar’s (2001) ‘*The Grammar of Hausa language*’. Equally of relevance to this data elicitation, were the major monolingual Hausa newspapers (both old and recent), such as Gakiya Tafi Kwabo, Aminiya, A Yau, which were consulted with the aim of identifying some topical articles that contain the relevant data in relation to phonology-morphology interface in Hausa, particularly those that appeared in form of nominal and verbal reduplicated morphosyntactic strings.

In the process of eliciting this data, structured reduplicative nominal and verbal morphosyntactic constructions were extracted from those materials. They were

eventually presented to the identified informants who were asked to pronounce them while the recording was on, and in that way observation of peculiar details pertaining to assimilatory processes was being made.

3.5 Summary of Chapter Three

This chapter discussed the research design of the current study, the sample size and the sampling technique employed in the process of data elicitation as well as the tool used in the preliminary data analysis. The procedure of primary and secondary data elicitation was thoroughly discussed with clear explanations on the target informants and materials used in sourcing the data.

CHAPTER FOUR

SEGMENTAL ASSIMILATION IN HAUSA NOMINAL REDUPLICATION

4.1 Introduction

This chapter presents the various analyses of the interface phenomena in respect of assimilatory processes within the nominal and verbal reduplicative operation that often result in the formation of reduplicated nouns and pluractional verbs in the language under investigation. Most of the data show very interesting interconnectivity between phonology and morphology within the domain of reduplicative morphology with consistent appearance of segmental features that potentially trigger the instantaneous assimilation which naturally occurs in form of feature spreading through the target structures. The autosegmental analytic representations in this chapter captured the nature and patterns of total segmental assimilatory operations in terms of feature-spreading mechanism in reduplicated nouns. It has also demonstrated illustrative autosegmental representations of partial segmental assimilatory operations which naturally occur in the same category of nominal morphosyntactic strings.

4.2 Autosegmental analysis of segmental assimilation in Hausa RNs

Reduplicated nouns in Hausa demonstrate an interesting phonology-morphology interface where segmental assimilation occurs in the reduplicative formation of some nominal forms in the language. The nature of assimilation in such reduplicated forms consistently involved both total and partial instances of segmental assimilations. The dimension of assimilation in the derived nominal forms will be shown in form of feature-spreading with directionality and locality of the operational spreading being optimally taken into consideration.

4.2.1 Segmental assimilation in reduplicated nouns

As previously discussed in chapter two, reduplicative nouns are formed via reduplication by partial copying of the base strings and attached to the base prefixally. The process of nominal reduplication that usually results in the formation of reduplicated nouns in Hausa involves prefixation of CVC-sequences – which means a copy of the initial string of the base itself. This section presents the autosegmental analyses of the nature and patterns of assimilatory operations in terms of feature-spreading within the reduplicated nominal morphosyntactic forms in Hausa. The analyses show how segmental assimilation totally and partially affects certain class of consonants in their respective positions of reduplication in the system. In instances where assimilatory operation becomes total in the prefixal reduplicative formation of nominal forms, the affected consonants are basically in form of obstruent against another obstruent. On the other hand, where the assimilation becomes partial in the reduplicative process, the consonants so affected are mostly sonorant against the obstruent in the prefixal positions.

4.2.1.1 Red-coda + Root-onset total assimilation

The pattern of assimilation here shows a kind of feature spreading that totally changes the target segment to become exactly like the trigger segment in the prefixal reduplicative operation that result in the formation of reduplicated nouns in Hausa. Segments that are established to exhibit this assimilatory tendency in the process of nominal reduplication are mostly obstruent and sonorant consonants, involving stops and fricatives as well as sonorant consonants.

4.2.1.1.1 Obstruent–obstruent total assimilation

This section discusses the nature of assimilation involving only the obstruent segments (reflecting stops and fricatives) within the reduplicated nominal forms in Hausa. The data in the analyses show a conspicuous local assimilatory operation affecting manner feature, and in other instances, affecting the place feature in terms of feature-spreading mechanism.

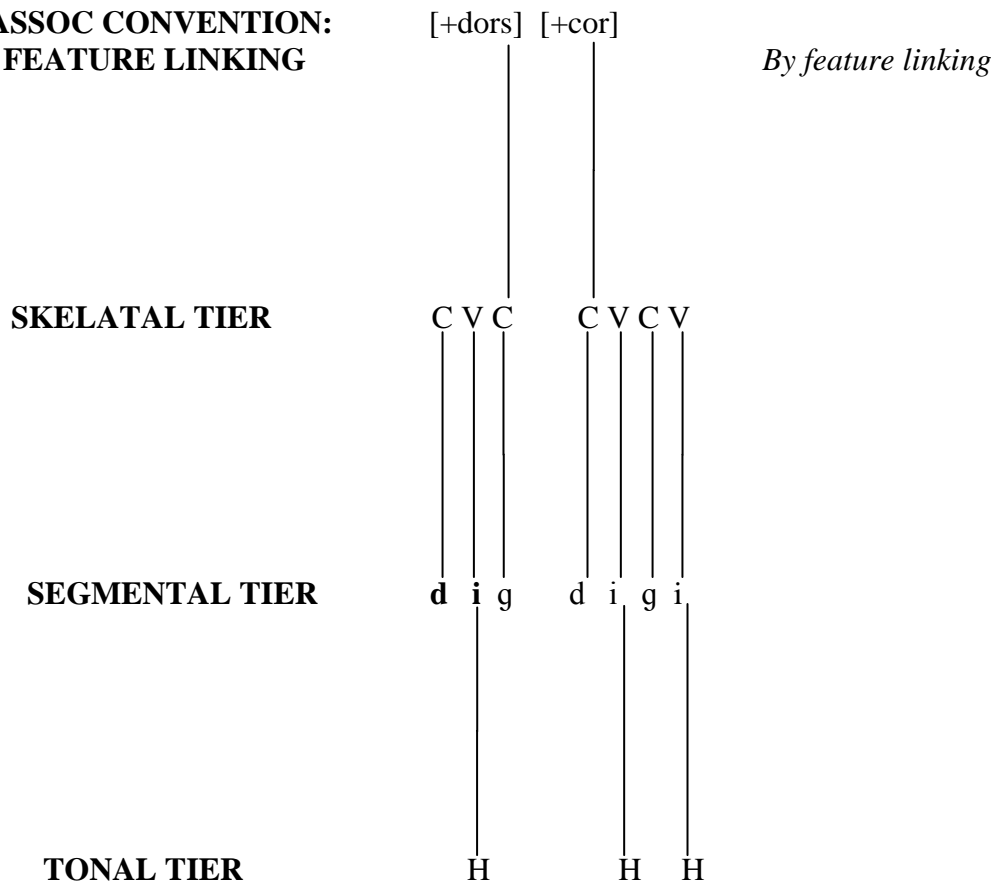
4.2.1.1.1.1 Stop+stop total assimilation

The coda stops of the reduplicated element and the Onset stops of the Root element become totally assimilated in the adjacent positions of the prefixal partial reduplication of the Hausa nominal forms. These set of consonants are all plosives

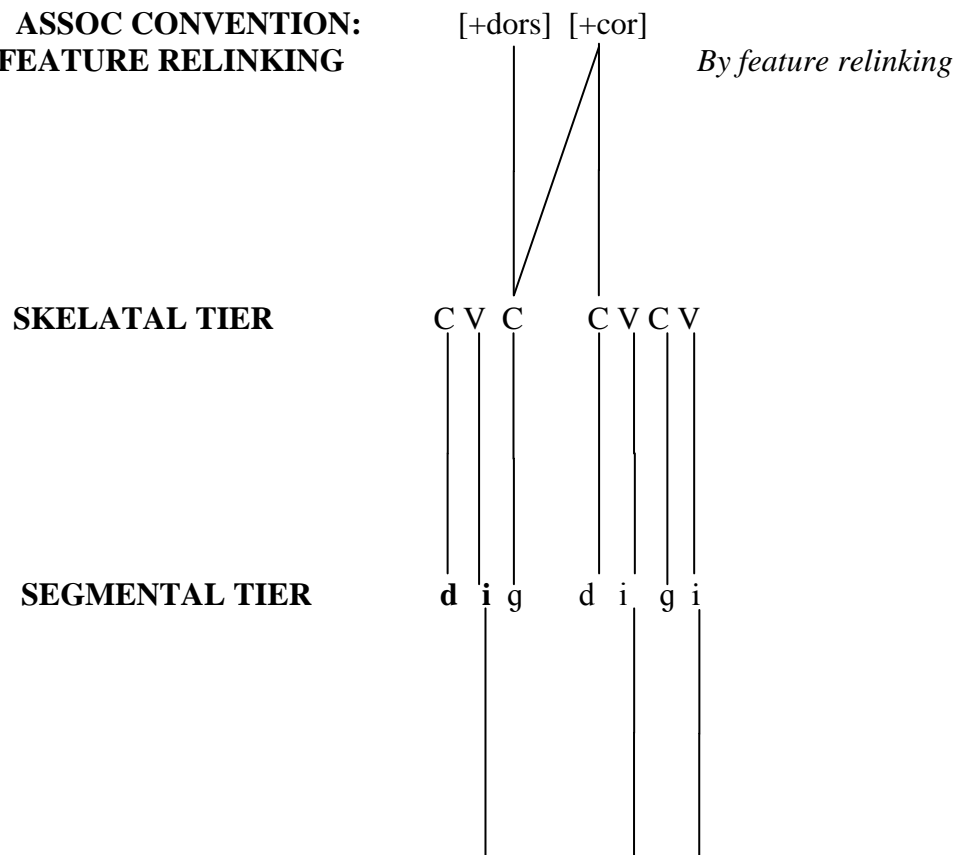
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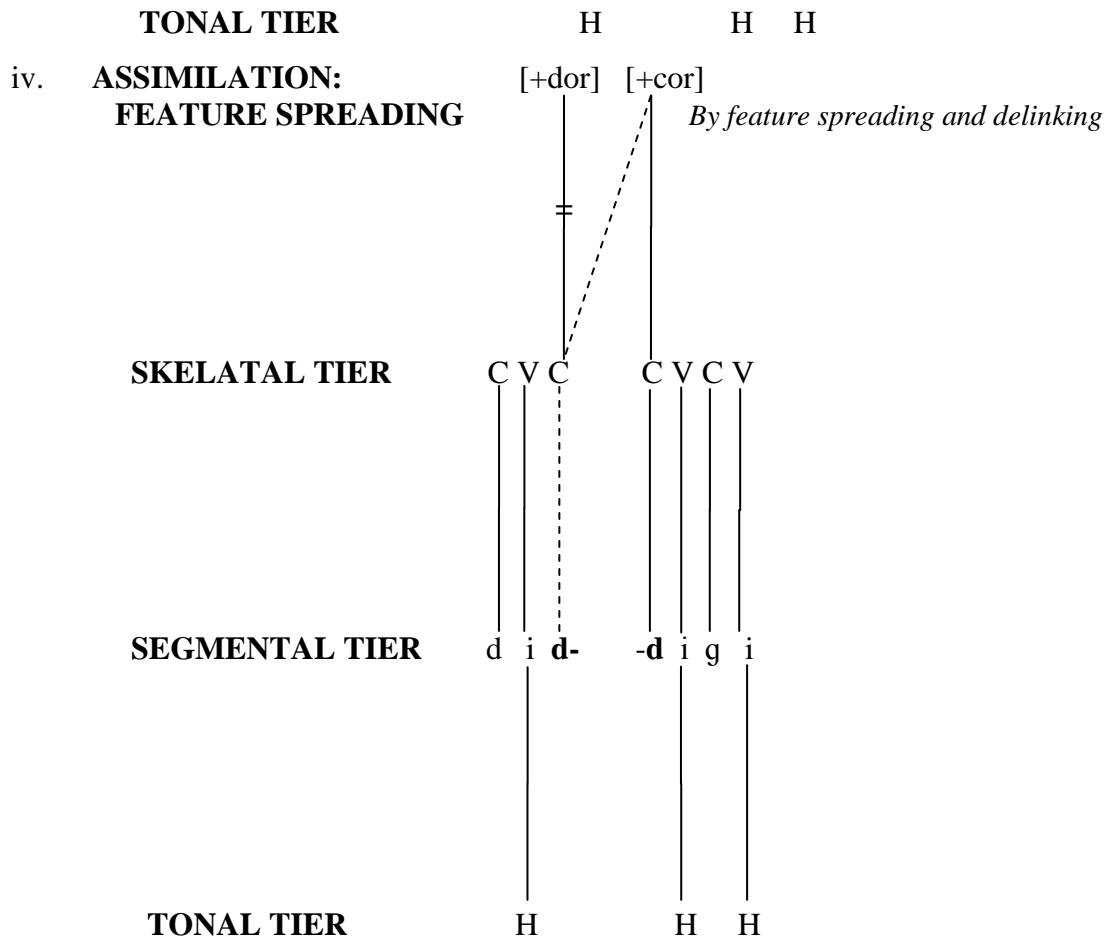
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ii. **ASSOC CONVENTION:
FEATURE LINKING**



iii. **ASSOC CONVENTION:
FEATURE RELINKING**





The autosegmental representations in 4.1a above represent a typical analysis of the assimilatory operation exhibited in the data in 36. Similarly, it also show a consistent behavior of assimilatory operation where the only influential feature between the target segments in the position of assimilation is that of *place* (velar) as indicated therein. Since the fundamental focal point of the current analysis is on the nature and dimension of segmental assimilation, the representations (in 4.1a i-iv) above show a conspicuous nature of homorganic assimilation occurring in the target reduplicated nouns and is, as shown in the data that affects only the obstruent stops in a regressive manner.

As shown in the analyses, the coda consonant of the reduplicated CVC in the underlying form has been influenced by the place feature of the onset of the root CVC in left-edged reduplication which consequently transforms to vestigial reduplicated nouns. In essence, the place feature (alveolar) of the onset root CVC, which is also classified as coronal (+cor), is considered as the *trigger* feature that affects the *target* velar segment, also classified as dorsal (+dor). This operation occurs via feature-spreading mechanism and, in the same occurrence, delinking the original feature of velarity attributed to the underlying root CVC coda segment. This process will in turn

lead to acquiring the coronal feature from the adjacent abutting coronal alveolar segment in the onset position of the root CVC.

4.2.1.1.1.2 Stop+fric total assimilation

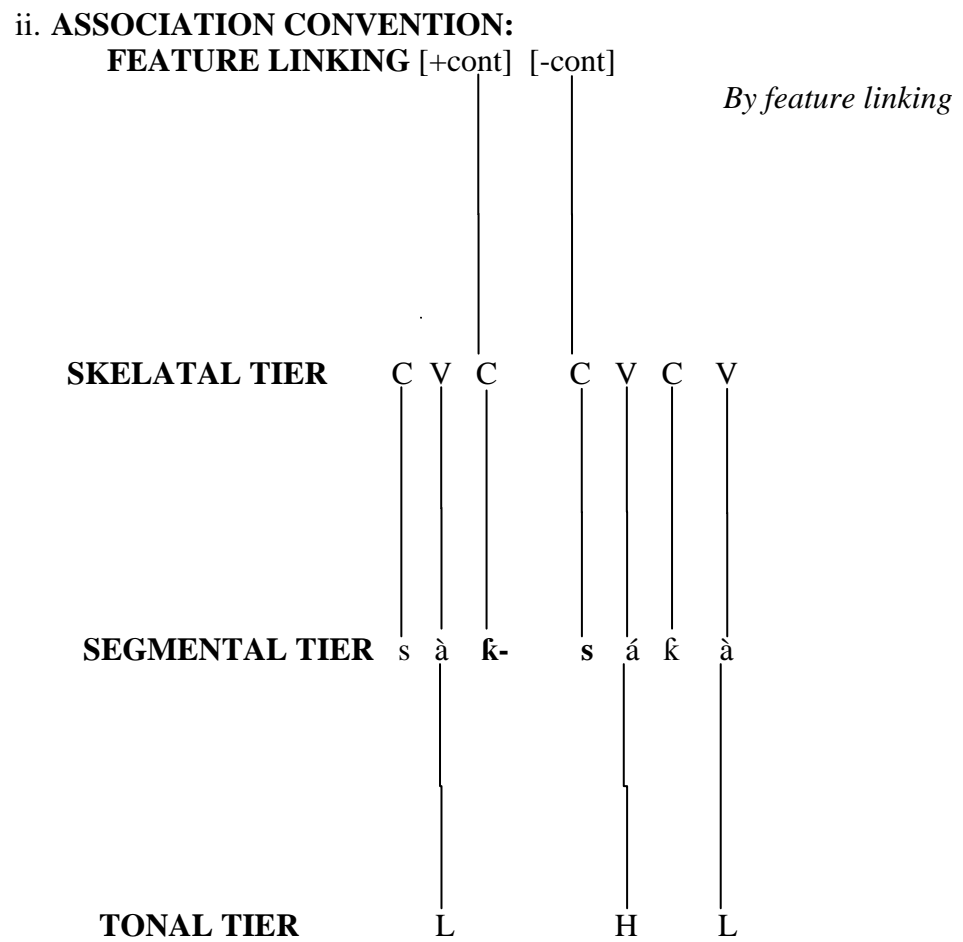
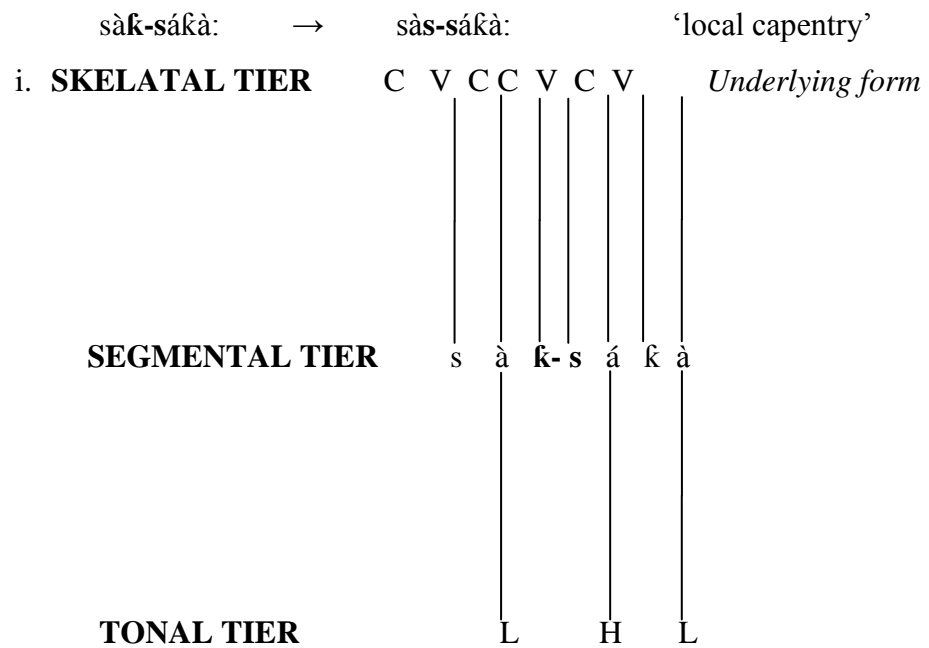
In this language, total assimilation occurs in the position of adjacent coda stop of the reduplicated CVC and onset fricative of the root CVC. The set of data that follow exhibits certain tendency of total homorganic assimilation involving non-continuant obstruents (in the position of target segments) and continuant obstruents (in the position of trigger segments) of reduplicated nouns. Consider the following data:

<i>37. Underlying form</i>	<i>Reduplicated forms</i>	<i>Surface form</i>	<i>Gloss</i>
sák-à:	sàksák-à:	sàssák-à	‘local capentry’
zàb-í:	zà b zàb-í:	zàzzàb-í:	‘fever’
ʃák-á:	ʃàkʃák-á:	ʃàʃʃák-á:	‘mashed rice with papper
ʃíg-í:	ʃìgʃíg-í:	ʃìʃʃíg-í:	‘middlesomeness’
zá:k-á:	zàkzá:k-á: ⁴⁷	zàzzá:k-á:	‘sweetened’
ʃàk-á:	ʃàkʃàk-á:	ʃàʃʃàk-á:	‘gasping’
sák-è:	sàksák-è:	sàssák-è:	‘peel of a tree’
sàb-é:	sàbsàb-é:	sàssàb-é:	‘clearing of farm’
súk-à:	sùksúk-à:	sùssúk-à:	‘threshing of grains’
ság-ó:	sàgság-ó:	sàsság-ó:	‘small saw’
ʃík-è:	ʃíkʃík-è:	ʃíkʃʃík-è:	‘wing of bird’
záb-ò:	k ^w à.zà b záb-ò:	k ^w à.zàzzáb-ò:	‘gorge’

In 37 above, the data demonstrate a systematic assimilatory operation affecting obstruent consonants (stops and fricatives) that are phonetically described on the basis of manner of articulation as continuant ([-cont]) and non-continuant ([+cont]), respectively. The illustrative representation of the analysis of the pattern of assimilation in the data is shown in the following autosegmental representations:

⁴⁷ This is a reduplicated morphosyntactic nominal form of adjective that was originally derived from the underlying simple adjective form zá:kí: (which means sweet).

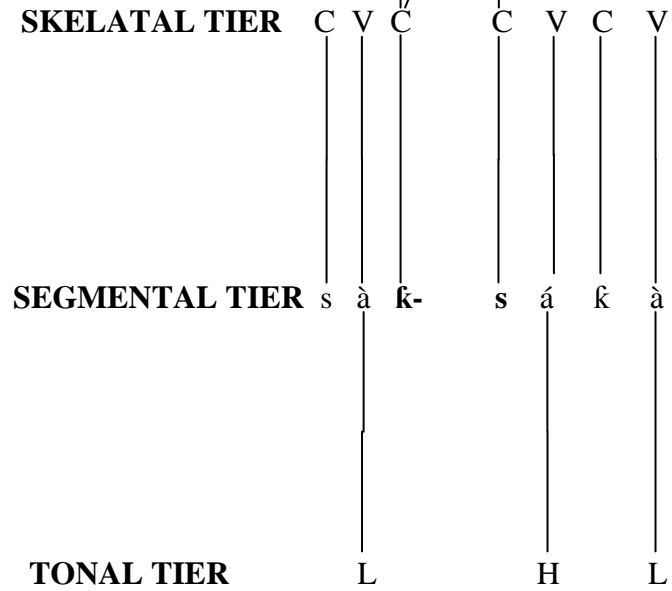
4.1b: **Stop+Fric Total Assimilation**



iii. ASSIMILATION:

FEATURE RELINKING [+cont] [-cont]

By feature relinking

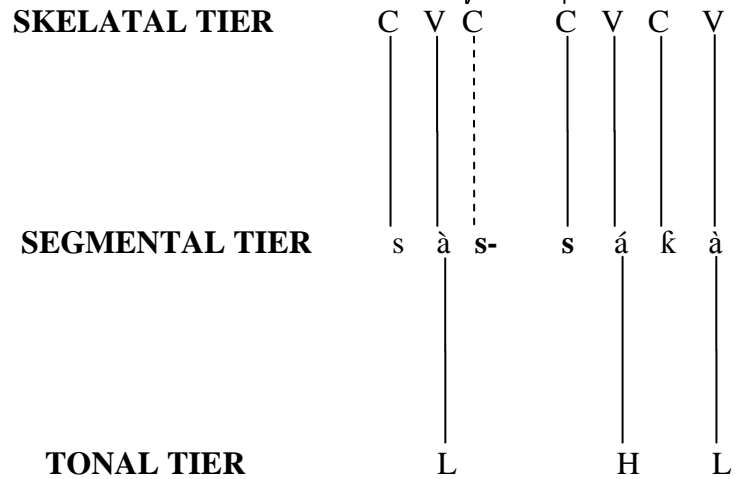


iv. ASSIMILATION:

FEATURE SPREADING

[+cont] [-cont]

By spreading and delinking



The underlying form in 4.1b (i) shows a reduplicated form of the morphosyntactic noun before the application of assimilation rule that consequently transformed it to its surface form as shown in 4.1b (iv). As pointed out in the preceding discussion, the nature of assimilatory operation in these reduplicated forms is such that significantly affects only the manner features of the target obstruent segments that are phonetically classified as $[\pm cont]$. Similarly, the direction of the feature spreading in the process is retrogressive in nature and is technically referred to as ‘anticipatory assimilation’. This operational phenomenon can as well be considered as a weakening strategy affecting *stop* and *fricative* segments thereby reducing the strength of the *stops* from being *non-continuant* to *continuant* segments.

The nature of assimilation in the reduplicated nouns in 4.1b above appears to involve segments in the adjacent positions, which implies that such instance of assimilation is local not long-distance since there is no intervening segment between the trigger and target segments within the operational domain. The domain of assimilatory operation in the reduplicative formation of the forms therefore constitutes the trigger segment in the onset position of the root CVC which spreads the feature of $[+cont]$ to the target segment of the Red-CVC coda and as a result of that it becomes totally assimilated to it in respect of the mannerism of the airflow.

4.2.1.1.1.3 Fric+stop total assimilation

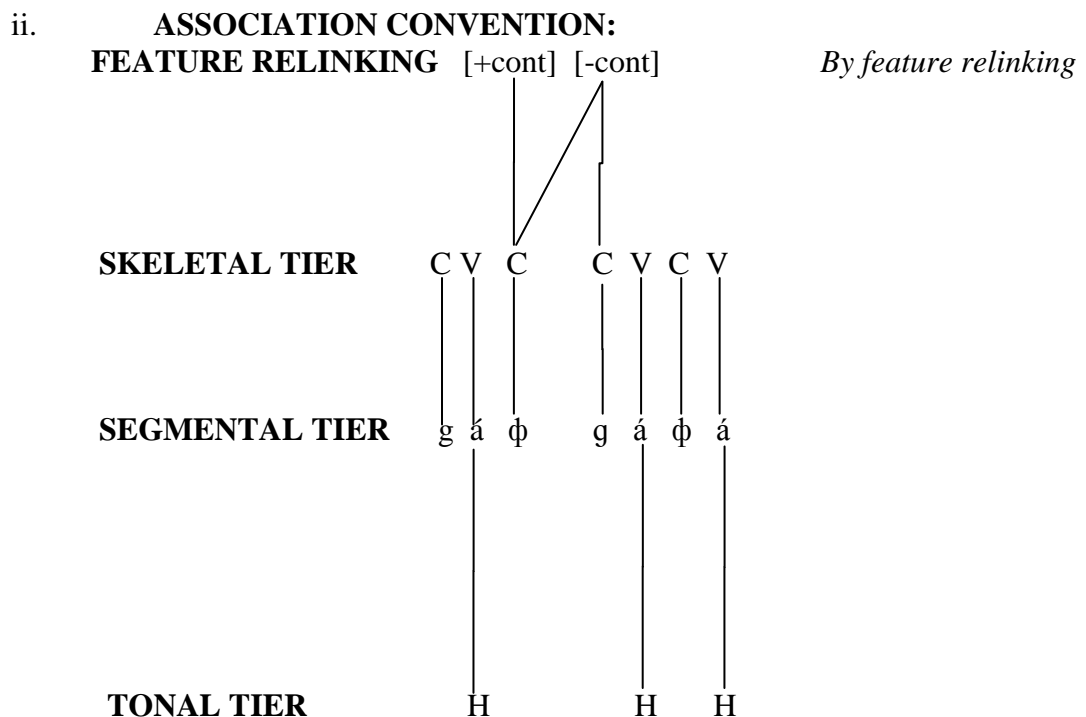
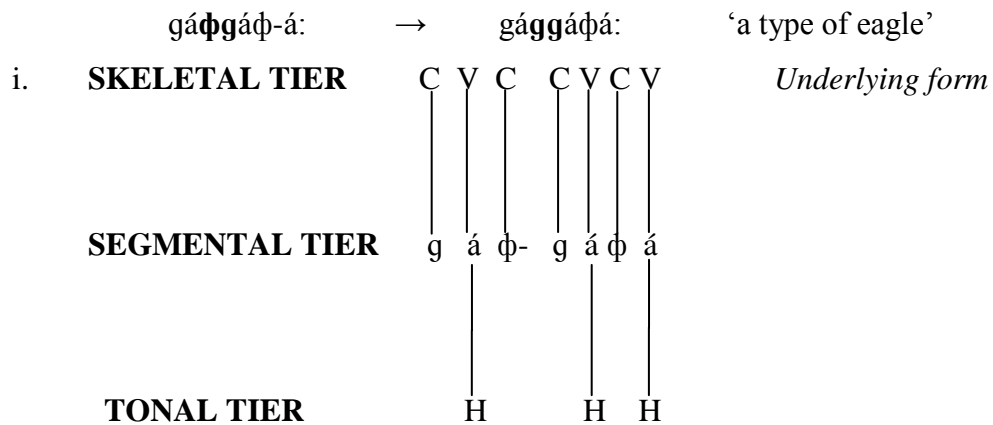
There is an evidence of reduplicated nouns in Hausa language where the segments involved in the assimilatory operation are in form of fricative-stop sequences in the adjacent position. These set of obstruent segments tend to exhibit phonological influence in which case the onset stop segment in the sequence influences the coda fricative segment by spreading its manner feature (classified as $[-continuant]$) to the neighbouring segment with the feature of $[+continuant]$. Consider the data below:

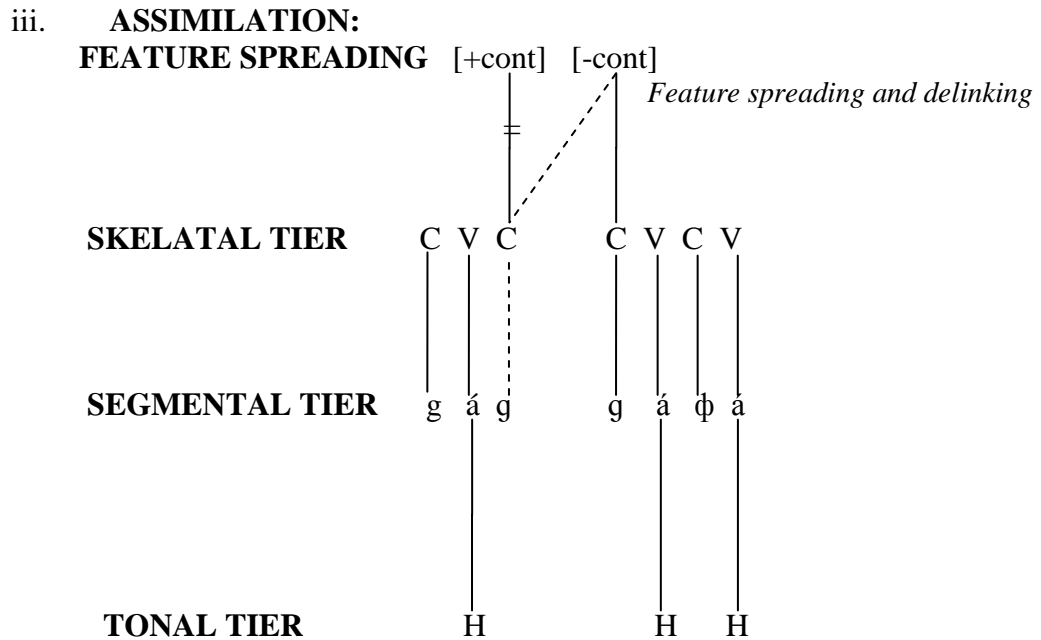
38.	<i>Underlying form</i>	<i>Reduplicated forms</i>	<i>Surface form</i>	<i>Gloss</i>
	k ^w áφ-í:	k ^w áφk ^w áφ-í:	k ^w ákk ^w áφ-í:	‘inquiry’
	gáφ-á:	gáφgáφ-á:	gággáφ-á:	‘a type of eagle’
	dúφ-í:	kù.dúφdúφ-í:	kù.dúddúφ-í:	‘borrow pit’
	dó:φá:	dóφdó:φ-á:	dóddó:φá:	‘synchopancy’
	tàφái	lì.tàφtàφ-ái	lì.tàttàφ-ái	‘books’

Although most of the forms in 38 were extracted from Newman (1989 and 2000), they appear to be very relevant to the current study since they show a consistent behavior of

systematic segmental assimilation. As demonstrated in the data, contrary to the dimension of assimilatory operation exhibited by the reduplicated forms in 39, the nature of assimilation here can be best described as a form of strengthening strategy where fricatives change to stops by feature-spreading in a retrogressive direction. It shows that the onset segment of the root CVC is a stop obstruent while the coda segment of the root is a fricative. The same CVC is reduplicated in the prefixal position and its coda fricative appears adjacent to the root onset stop which in turn spreads its manner feature ([+cont]) to the preceding continuant obstruent. This situation is represented in the analytic representations below:

4.1c: **Fric+Stop Total Assimilation**





The representations in 4.1c above demonstrate the analysis of segmental assimilation involving the target obstruent segments in the reduplicated nouns. The obstruent segments are in the pattern of fricative-stop sequence where the assimilatory tendency of the forms is such that has to do with obstruent strengthening. The process of assimilation applies after the partial reduplication of the root CVC element where a non-continuant feature of the stop obstruent spreads in a regressive manner to influence the target fricative obstruent and thereby strengthened it to a non-continuant stop. As demonstrated in the analytic representations, the main difference between the assimilatory operation shown in 37 and the current one is simply that the former involves weakening process of obstruent segments, while the latter is obviously a strengthening process of same obstruent segments.

4.2.1.1.2 Obstruent-sonorant total assimilation

This section is committed to providing descriptive analyses of the nature of assimilation involving sequences of obstruent (stops and fricatives) and sonorant consonantal segments in the reduplicated nouns in Hausa. Although the type of reduplication that yields the said morphosyntactic forms is partial, the phonological assimilation affecting those segments tends to be total. Similarly, the sequence of these consonants is basically in the forms of stop-sonorant and fricative-sonorant sequences.

4.2.1.1.2.1 Stop/fric-son total assimilation

The focus in this section is to discuss the nature of segmental assimilation involving the sequences of stops and fricatives against the sonorant consonants in the morphosyntactic reduplicated nouns. The sonorant segments in this context usually appear in form of nasals, laterals and glides which always show a consistent triggering effect of assimilation on the preceding non-sonorant segments which consequently change to the nature of the manner feature of the abutting sonorant segments via feature-spreading mechanism involving the [+son] feature. This phenomenon is shown in the following sets of data:

39.	<i>Underlying form</i>	<i>Reduplicated forms</i>	<i>Surface form</i>	<i>Gloss</i>
i.	múkè:	múk kmúk -è: ⁴⁸	mú mmúk è:	'jaw'
	múk-à:	múk kmúk à:	mú mmúk à:	'of washing cloths'
	nàg-é:	nàg gnàg -é:	nà nnàg -é:	'pounding tomatoe'
	láb-à:	láb láb -à:	láb lláb -à:	'soothing/flattering'
	lúb-í:	lúb lúb -í:	lúb llúb -í:	'body cover veil'
	rúb-í:	kù.rúb brúb -í:	kù.rúb rrúb -í:	'shallow water hole'
ii.	ràφ-é:	ràφ ràφ -é:	rà rràφ -é:	'baby crawling'
	jáφ-í:	jáφ jjáφ -í:	já jjáφ -í:	'rain sprinkle'
	rá:ǰí:	rá:ǰ rrá:ǰ -í:	rá:ǰ rrá:ǰ -í:	'pleading with children'

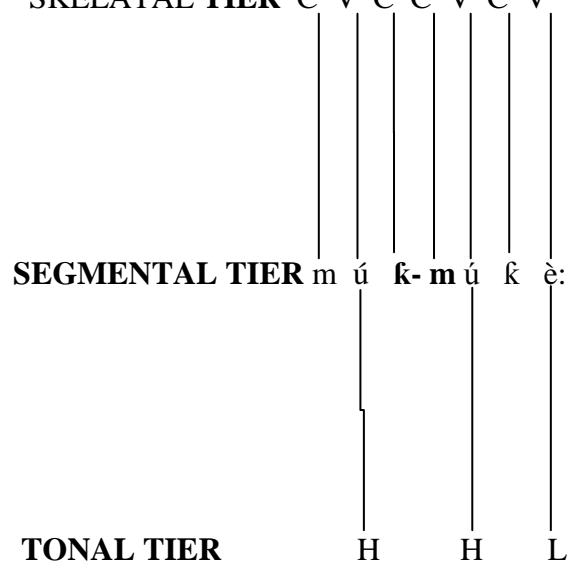
The sets of data in 39 show a consistent regressive assimilation affecting the final coda stop or fricative of the reduplicated CVC element and the onset sonorant consonant of the root CVC. As can be seen in the data, the reduplicated forms are derived from non-active or frozen roots via partial reduplication and then phonological operation in form of segmental assimilation applies. The nature of assimilation affecting the target sequences of consonants in the reduplicated nouns is obviously attributed to manner feature, which is captured here under the feature [\pm son]. The trigger segments, which are classified under sonorant, contain the [+son] feature which spreads to the preceding non-sonorant segments containing the [-son] feature. Consider the following representations showing the possible autosegmental analyses of the assimilatory operation therein:

⁴⁸ This reduplicated form of noun is drawn from *Sakkwatanci*; one among the dialects of western Hausa.

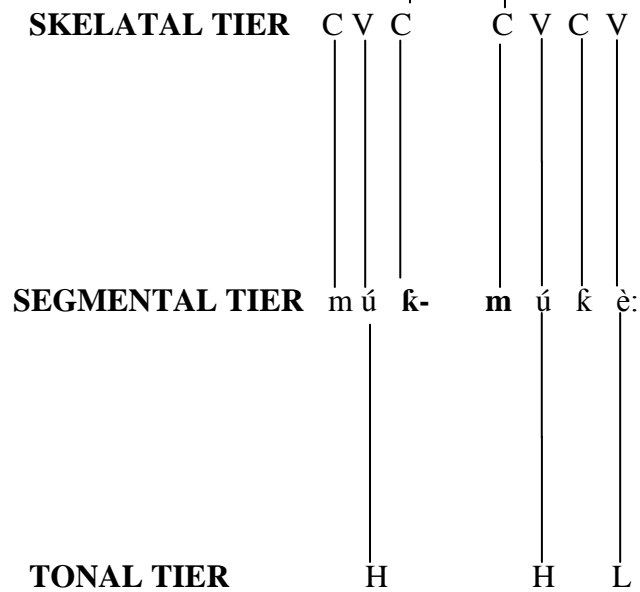
4.1d: **Stop+Son Total Assimilation**

múk-è: → múkmúk-è: → múmmúkè: 'jaw'

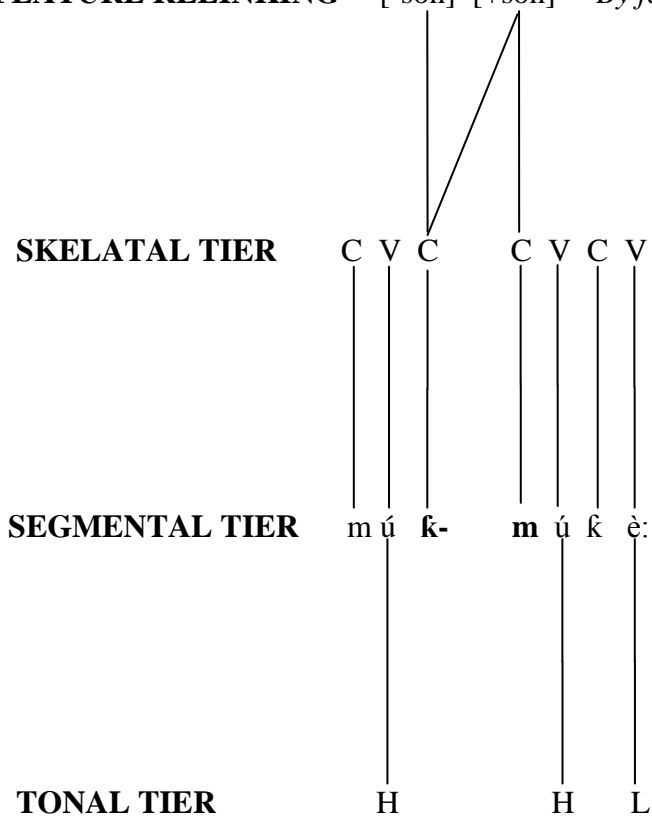
i. **SKELATAL TIER** C V C C V C V *Underlying form*



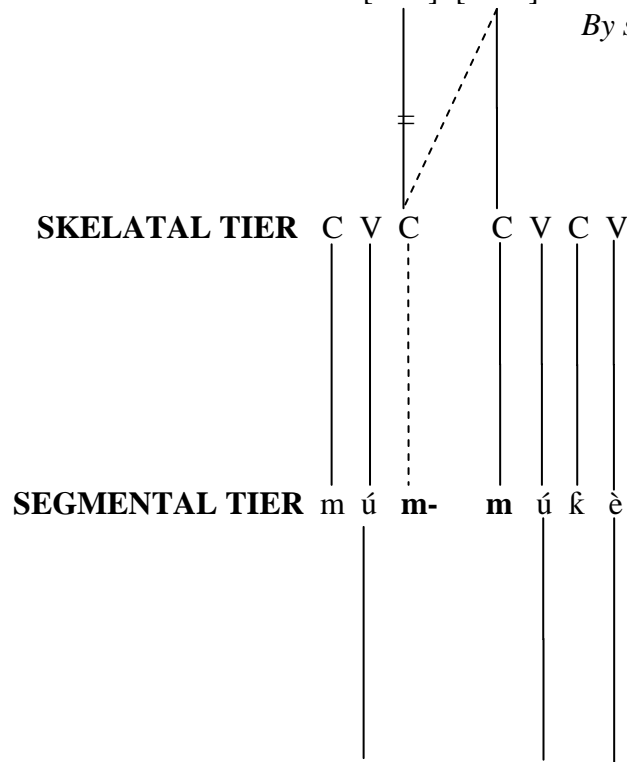
ii. **ASSOCIATION CONVENTION:**
FEATURE LINKING [-son] [+son] *By feature linking*



iii. **ASSOCIATION CONVENTION:**
FEATURE RELINKING [-son] [+son] *By feature relinking*



iv. **ASSIMILATION:**
FEATURE SPREADING [-son] [+son] *By spreading and delinking*



Segmental assimilation involving sequences of sonorant-stop consonants is attested in the reduplicated nouns of Hausa. Based on the available data elicited for this research, the only sonorant consonants attested to have exhibited the tendency of total assimilation within the operational domain of reduplicated nouns in the language are *alveolar-lateral*, *glide* and *alveolar-trill*. These *sonorant* segments occur in the coda positions of the reduplicated CVC, adjacent to the onset *stops* of the root CVC. Consider the data below⁴⁹:

40.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
i.	gáw-á:	gá w gáw-á:	gá gg gáw-á:	‘hastening’
	dáw-á:	dà w dáw-á:	dà dd dáw-á:	‘locust bean cake’
	dúr-ú:	dúr d dúr-ú:	dúr dd dúr-ú:	‘small steam’
	káw-á:	ká w káw-á:	ká kk káw-á:	‘loud laughter’
	kárɸ-á:	kà r kárɸ-á:	kà kk kárɸ-á:	‘strongest (adj)’
	k ^J áw-á:	k ^J à w k ^J áw-á:	k ^J à kk ^J k ^J áw-á:	‘beautiful’
	dír-à:	dír d dír-à:	dír dd dír-à:	‘complicated diarrhea’
	dòj-à:	dò j dòj-à:	dò dd dòj-à:	‘a fragrant herb’
ii.	sáuk-á:	sà w sáuk-á:	sà ss sáuk-á:	‘simplest’
	sáw-á:	kà.sá w sáw-á:	kà.sà ss sáw-á:	‘a type of spear’
	sál-í:	sá s sál-í:	sá ss sál-í:	‘local male hair-cut’
	sál-à:	sá s sál-à:	sá ss sál-à:	‘origin’
	sár-á:	mà.sá r sár-á:	mà.sà ss sár-á:	‘fever’
	zál-à:	zà l zál-à:	zà zz zál-à:	‘pulling out’
	gár-à:	gá r gár-à:	gá gg gár-à:	‘verge of extinction’

The data in 40(i) also demonstrate a total segmental assimilation affecting sequences of sonorant-stop consonants in the context of reduplication that resulted in the formation of reduplicated nouns. Unlike the preceding data set in 43 where sonority is the dominant and triggering feature in the assimilatory operation, in the context of this assimilation the obstruent stops dominate the sonorant segments thereby spread the [-**son**] feature in a retrogressive manner which consequently transform the coda sonorant of the reduplicated CVC to a stop-like of the onset of the root CVC. This operation is represented in the following autosegmental analyses:

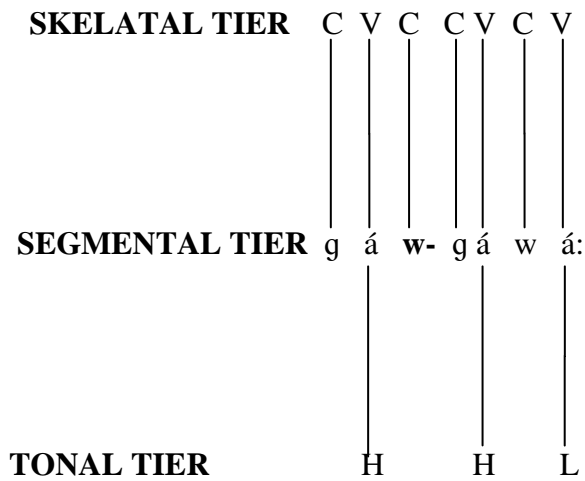
⁴⁹ It should be noted that most of the data in these sets are extracted from Newman (1979 and 2000); they are shown to be relevant to the current analysis.

4.1f: **Son+Stop Total Assimilation**

gáw-á: → gáwgáw-á: → gáwgáw-á:

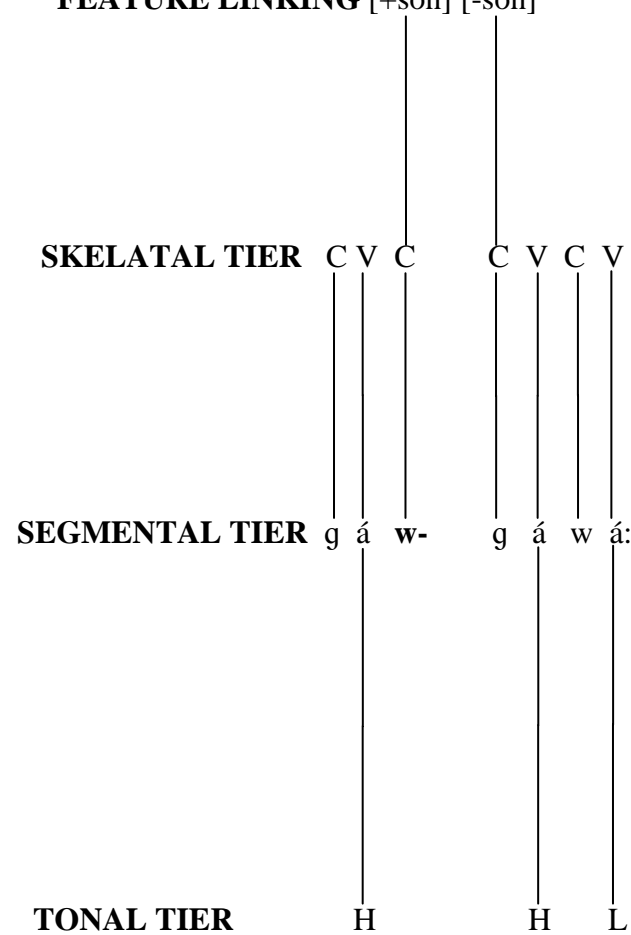
‘hastening’

i. **SKELATAL TIER** C V C C V C V *Underlying form*



ii. **ASSOCIATION CONVENTION:**
FEATURE LINKING [+son] [-son]

By feature linking



TONAL TIER H H L

As can be clearly seen in the autosegmental representations in 4.1f, the analysis of the assimilatory operation in the reduplicated nouns describes the dimension of the sonority feature spreading which is shown to be the trigger feature that dominates the entire phonological process in the reduplicative formation of the forms. This situation confirms that the *obstruent stop* in the onset position of the root CVC is associated with the feature of [-son] which naturally spreads backward to influence the underlying *sonorant* segment in the coda position of the reduplicated CVC. This coda segment, on the contrary, associated with the [+son] feature. Similar phonological operation is attested in the *sonorant-fricative* sequences occurring in the same context of reduplication. Thus, consider the analysis in the following representations:

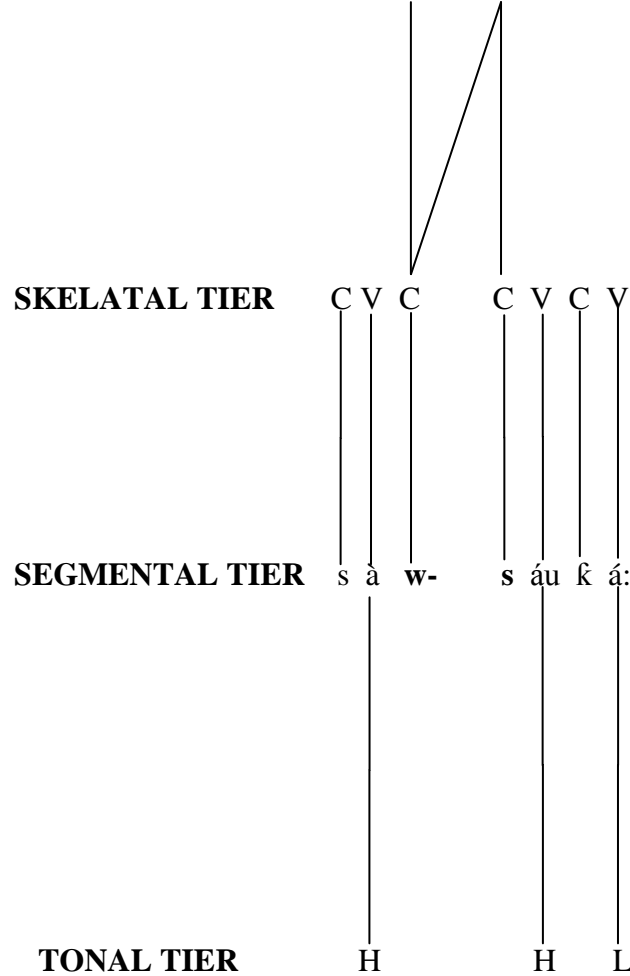
4.1g: **Son+Fric Total Assimilation**

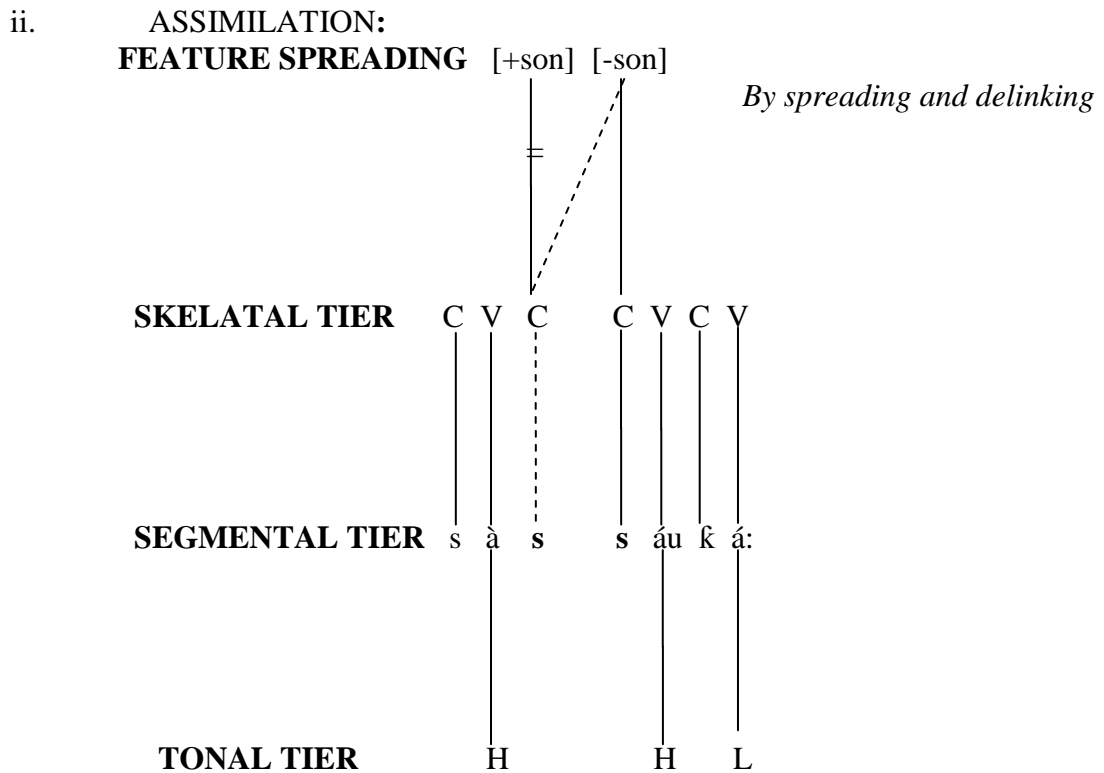
sáuk-á: → sàw-sáuk-á: → sàssáuká: ‘simplest’

i. **ASSOCIATION CONVENTION:**

FEATURE RELINKING [+son] [-son]

By feature Relinking



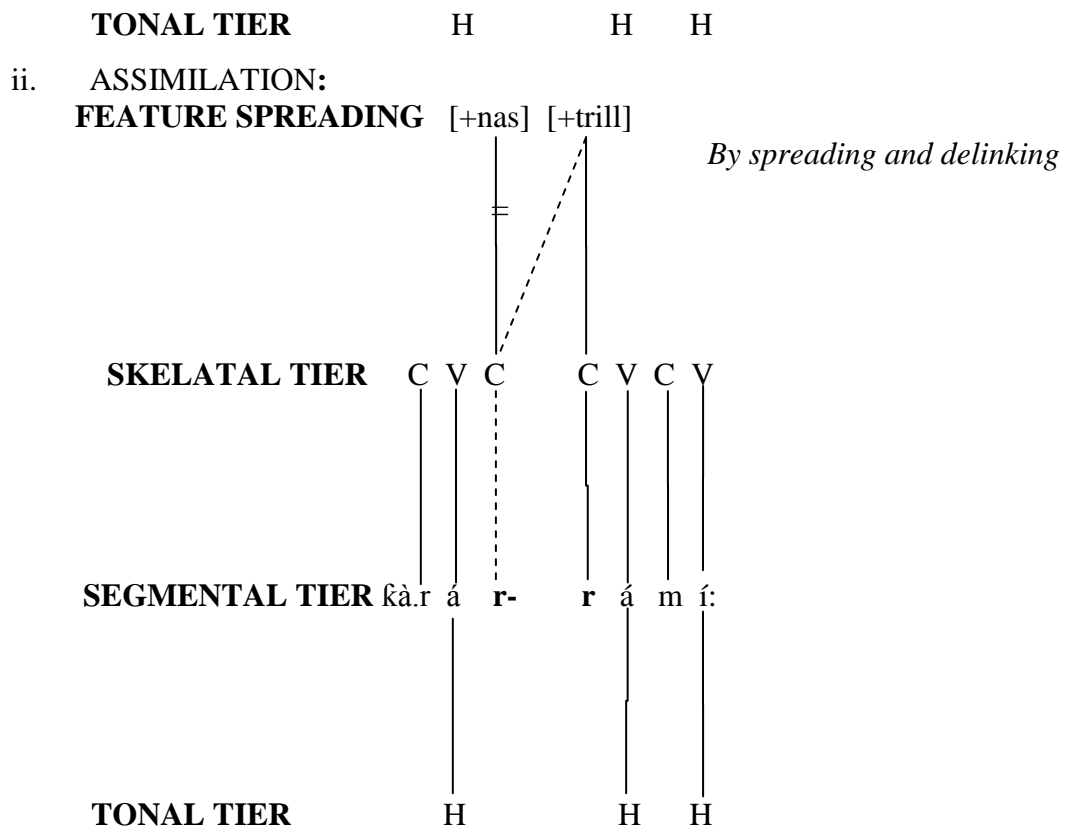


The autosegmental representations in 4.1f demonstrate an analysis of assimilation similar to that in 4.1e, which described the nature of segmental assimilation in the reduplicated nouns in 40(ii). The analyses in 4.1f indicate that the segmental feature-spreading in the context of the reduplicative formation of nouns implies that [-son] of the root onset fricative is the trigger feature, while the feature of the target coda segments of the reduplicated CVC is [+son]. It is also noticeable that the round vowel [-u] in the stem-CVC changed to a bilabial glide [-w] to coincide with the consonant-consonant assimilatory transformation.

4.2.1.1.4 Sonorant-sonorant total assimilation

The following data exhibit total assimilatory operation affecting sequences of *sonorant-sonorant* segments in the morphosyntactic reduplicated nouns. Naturally, consonantal segments associated with sonority are in form of nasals, liquids and glides, and are usually attributed to [+son] feature. As shown in the data, there exists an irregular pattern of segmental total assimilation in the context of reduplicative formation of nouns. Consider the following data⁵⁰:

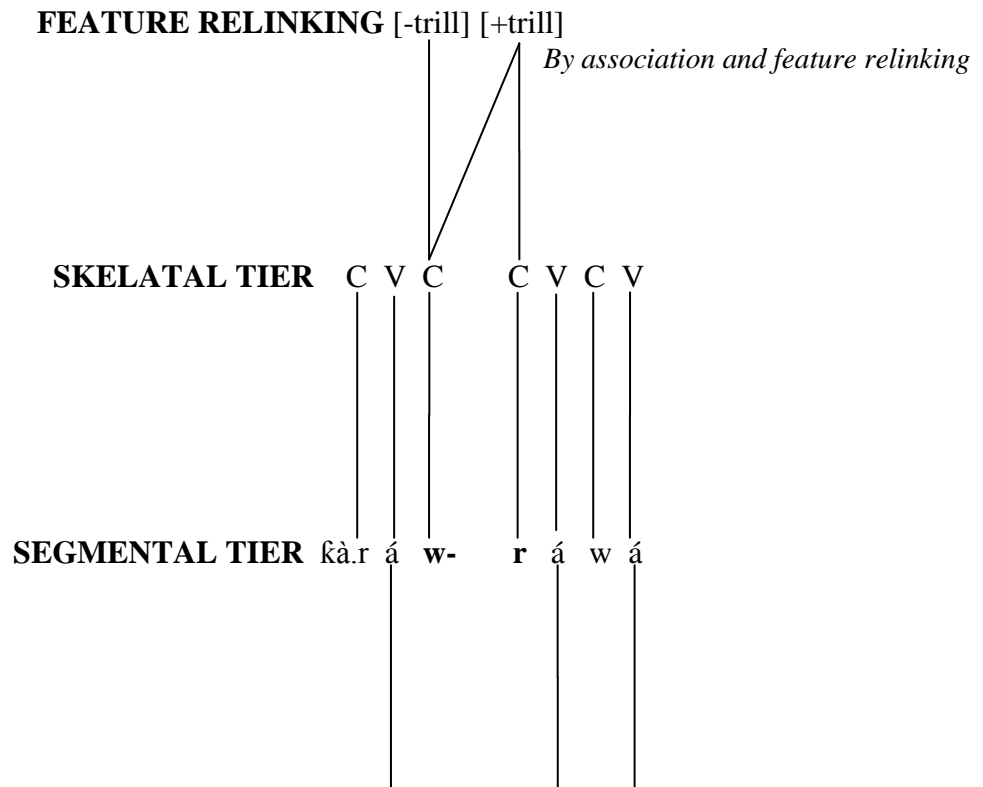
⁵⁰ Most of the data in this set were extracted from Newman (1986, p. 21).



4.1h (b): **Son+Son (w~r) Total Assimilation**

ráw-á: → kà.ráwráw-á: → kà.rárráwá: 'ring bell'

i. **ASSOCIATION CONVENTION:**



4.2.1.2 Partial segmental assimilation in Hausa reduplicated nominal forms

This section is a bit digression from the type of segmental assimilation in the reduplicated morphosyntactic strings discussed in the preceding section and subsections. The current section focuses mainly on the nature of partial assimilation in the contexts of reduplicative formation of nominal forms involving both nouns and derived adjectives. The process of reduplication in the formation of reduplicated nouns is prefixal in nature, while that of derived adjectives is suffixal. In the same vein, the nature of segmental assimilation in the reduplicated nouns is partial and local, whereas the assimilatory operation in the derivation of verbal adjectives, though equally partial, appears to be subjacent or long-distant in nature.

4.2.1.2.1 Partial assimilation involving consonant-consonant segments in RNs

In the reduplicative process that usually results in the formation of morphosyntactic strings of noun class, the sequences of consonants attested in Hausa that often involved in a partial assimilation are in the form of sonorant-obstruent patterns. This form of assimilation is mainly attested in the prefixal partial reduplication of reduplicated nouns in Hausa as shown in the subsequent subsections.

4.2.1.2.1.1 Partial assimilation involving sonorant-obstruent segments in RNs

This section discusses the nature of partial assimilation in the forms of prefixal reduplicated nouns that involve adjacent sequences of sonorant-obstruent segments in the context of reduplication. The sonorant segments are mostly nasal, with few instances of lateral segments, and the obstruents include both stops and fricatives. This is conspicuously shown in the data that follow:

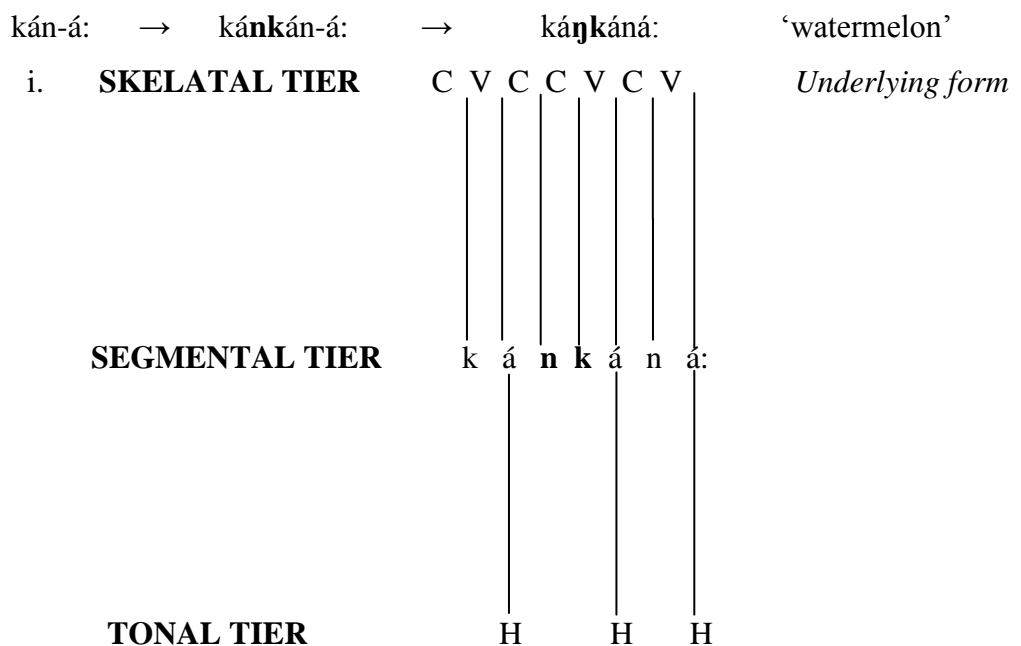
42.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>
	<i>Gloss</i>		
i.	kán-á:	kánkán-á:	káŋkáná: ‘watermelon’
	gúm-è:	gúngúm-è:	gúŋgúmè: ‘road block’
	gám-í:	gámgám-í:	gáŋgámí: ‘mobilization’
	kàm-í:	ɸàn.kámkàm-í: ⁵¹	ɸàn.káŋkàmí: ‘very broad’
	tám-á:	tántám-á:	tántámá: ‘doubt’
	dúm-í:	dumdum-í:	dùndúmí: ‘eye defect’

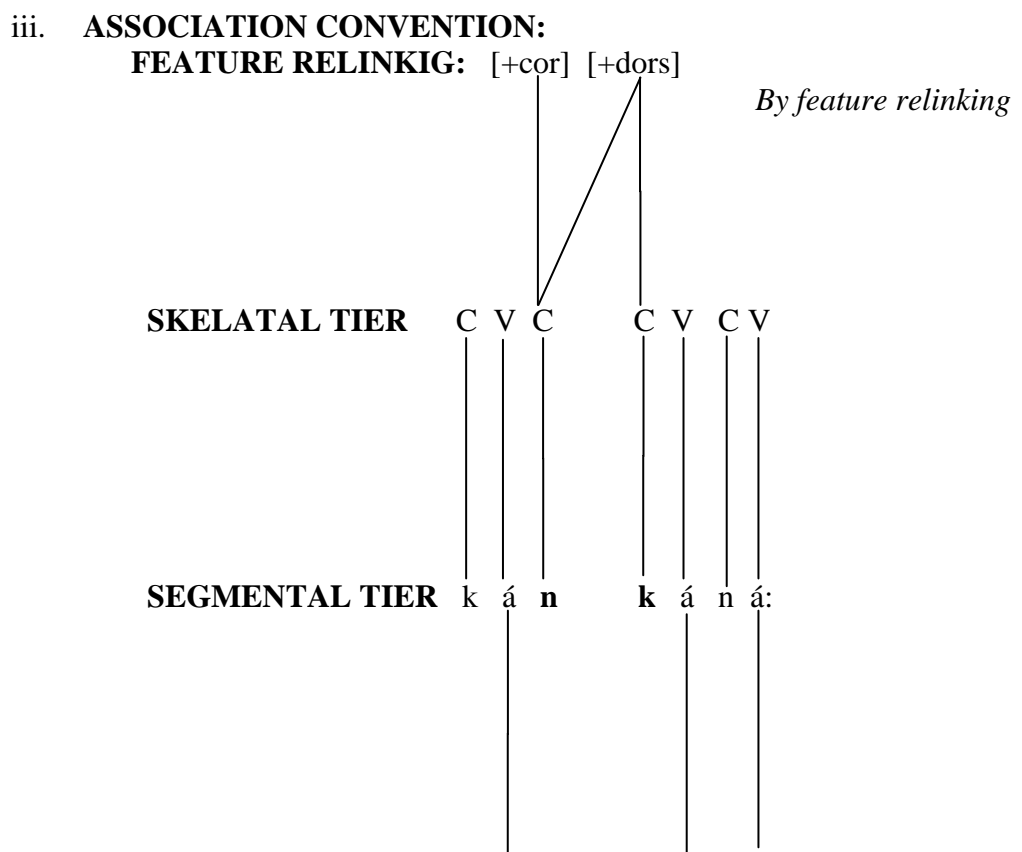
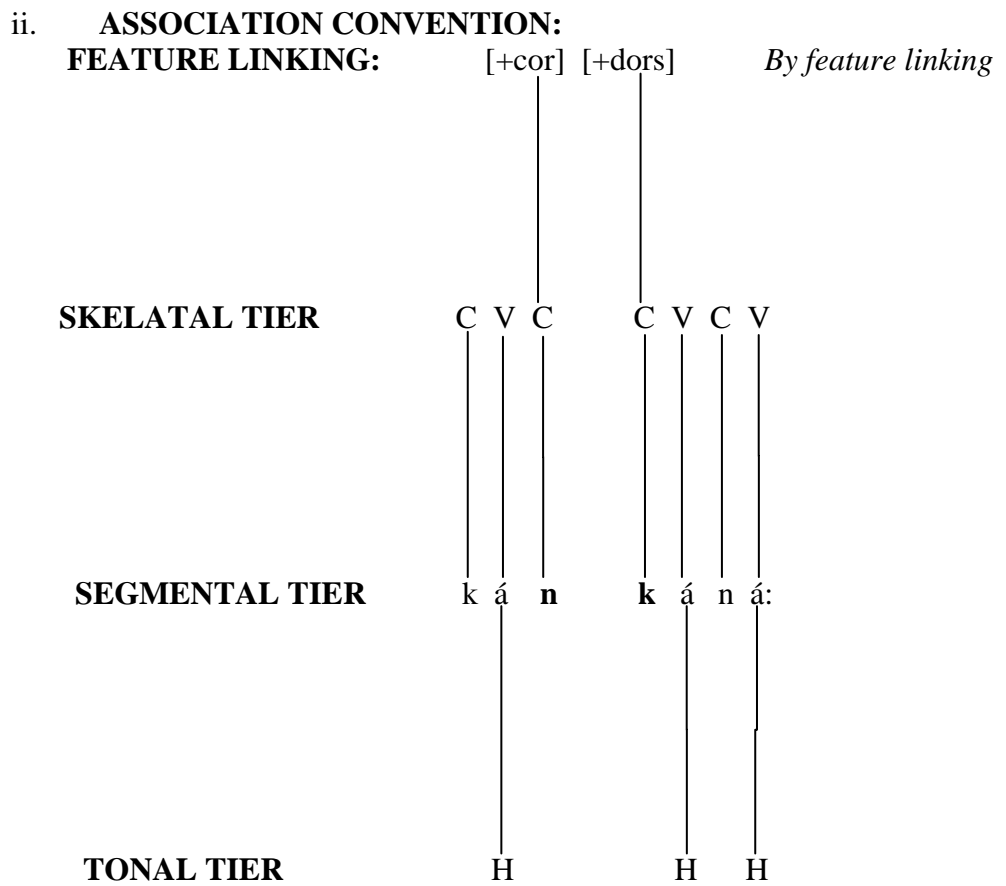
⁵¹ It is important to note that this reduplicated nominal form is ideophonic in Hausa and is equally being used as a frozen form of derived reduplicated noun in the language.

	dám-ò:	dà nd ám-ò:	dà nd ámò:	‘charming’
	g ^w án-í:	g ^w án g ^w án-í:	g ^w án g ^w ání:	‘metal tin’
	g ^j ám-á:	g ^j ám g ^j ám-á:	g ^j ám g ^j ámá:	‘wall of glass’
ii.	φùn-á:	φùn φ ùn-á:	φùn φ ùn-á:	‘fungus’
	sà:m-í:	sà ns à:m-í:	sà ns à:mí:	‘dry leaves’
	ʃá:n-í	ʃán ʃ á:ní	ʃán ʃ á:ní	‘a type of insect’
	zùm-í:	kà:.zúm z ùm-í:	kà:.zúm z ùmí	‘bedbug’
	zám-á:	zám z ám-á:	zám z ámá:	‘children sitting play’

The data in 42 demonstrate that partial assimilation involving sonorant-obstruent sequences occurs in the context of prefixal reduplication that resulted in the formation of reduplicated nouns in the language. As shown in the data above (42), the phonological operation exhibits consistent and systematic partial place assimilation affecting the nasals of the reduplicated CVC segments in the coda positions. The nasal segments in this position consistently appear in form of bilabial or alveolar, and their appearance in the immediate adjacent position that precede the onset segments of the root CVC naturally triggers the homorganic assimilation. Similarly, as shown in the following autosegmental analyses, the spreading of feature consistently appears in a retrogressive direction thereby results in an anticipatory assimilation. Consider the following analytic representations:

4.2a: Son+stop partial assimilation in RNs





fricative [ɸ] in the coda position of the reduplicated CVC and onset position of the root CVC, respectively. Similarly, the trigger segment (*bilabial fricative* [ɸ]) spreads, not only its labial feature ([+lab]) to the preceding adjacent nasal segment, but also its manner feature ([-cont]) - although not potentially dominant in the assimilation process that culminated in the transformation of the surface morphosyntactic forms.

4.2.1.2.2 Consonant-vowel partial assimilation in VDAs suffixal reduplication⁵²

The main focus in this section lies on the phenomenon of partial assimilation which occurs within the suffixal reduplication that naturally results in the formation of verbal derived adjectives in Hausa - which Newman (2000) refers to as ‘deverbalised adjectives’. These forms of adjectives are considerably different from the regular adjectives traditionally derived from the noun forms in the sense that they are historically derived from the basic verb forms in the language through reduplicative affixation⁵³. The pattern of assimilatory operation in the process of forming this category of adjectives, apart from its partial nature, involves the assimilatory process known as palatalisation. This is so because the contextual sequences of segments in the assimilation appear in form of consonant-vowel sequence. In all instances that will be shown in the data that follow, the nature of palatalisation in the language is such that involves sequences of underlying alveolar stops/fricatives ([t, d, s, z]) and, in most cases, high vowels [e], but also [i], on rare occasion.

4.2.1.2.2.1 Palatalisation of [s] in Hausa verbal derived adjectives

This section focuses on reduplication that affects obstruent ([+cont]) segments at suffixal positions in the surface forms - the process which in turn derives adjectives from their corresponding simple verb forms. Basically, the CVC-root of the simple verb forms ends in [s] at underlying level, but is usually sensitive to the suffixal vowel. That is, if the suffix vowel is [+back] ([u, o, a]), the underlying segment [s] is retained in the surface reduplicated form. However, if the suffix vowel is [-back] ([i, e]) the coda root

⁵² The sets of data in the subsections that follow have a noticeable tonal disparity between the underlying verb forms and the surface ‘deverbalised adjectives’. This disparity has not been analytically accounted for since tonal/non-segmental assimilatory analysis is not part of the scope of the current research.

⁵³ The concept of ‘reduplicative affixation’ was first expounded in the famous work of Marantz (1982) which was presented as a theory of reduplication and has been conceived in the literature as an extension of the theory of ‘non-concatenative’ morphology credited to McCarthy (1981).

segment ([s]) synchronically becomes palatalised to its voiceless counterpart as indicated in the following data showing a verbonominal derivation.⁵⁴

43.	<i>Underlying (verb) forms</i>	<i>Surface (noun) forms</i>	<i>Gloss</i>
	ɸás-à ‘to break’	ɸás-i → ɸáʃi	‘act of breaking’
	kás-à ‘to arrange things’	kás-i → káʃi	‘act of arranging things’
	dàs-ú ‘transplanted well’	dàs-é → dàʃé	‘transplanting’
	dós-ó ‘to come towards...’	dòs-i → dòʃi	‘coming towards...’

The set of data in 43 evidently shows a systematic root-internal phonological palatalisation which does not involve the process of reduplication. Since the focus of analysis here dwells on assimilatory process in the reduplicative formation of nominal forms in the language under research, the set of data that follows (44) clearly shows a process of partial reduplication in the derivation of adjectival forms in the language. The data shows that the coda segments in the underlying verb forms consistently appear in the form of a sibilant voiceless obstruent[s] and, the same segment, is reduplicated or copied in the surface adjectival derived forms, with little phonological adjustment. Although the scope of our analysis is restricted on the nature of palatalisation in the transformational process of these forms, it is important to explain that this kind of adjustment naturally leads to the realization of contextual gemination which is confirmed to be caused by the length of suffixal vowel of the reduplicant root coda consonant. However, in spite of the obvious phonological changes in the reduplicated segment in form of realizational gemination, the current study did not consider it as part of the analysis. Consider the set of data below:

44.	<i>Underlying (Verb) form</i>	<i>Surface (Adjective) forms</i>	<i>Gloss</i>
	gás-à ‘to roast’	gàs-àss-é: → gàsáʃʃé:	‘roasted one’
	ɸás-à ‘to break’	ɸàs-àss-é: → ɸàsáʃʃé:	‘broken one’
	tʃá:s-à ‘to thresh’	tʃà:s-ass-é: → tʃà:sáʃʃé:	‘threshed one’
	ɸés-à ‘to spread’	ɸès-àss-é: → ɸè:sáʃʃé:	‘spread one’
	kás-à ‘to arrange’	kàs-àss-é: → kàsáʃʃé:	‘arranged one’
	rús-à ‘to destroy’	rùs-àss-é: → rùsáʃʃé:	‘destroyed one’
	dás-à ‘to transplant’	dàs-àss-é: → dàsáʃʃé:	‘transplanted one’
	bú:s-à ‘to dry’	bù:s-àss-é: → bù:sáʃʃé:	‘dried one’
	tá.ɸàs-à ‘to boil’	tà.ɸàs-àss-é: → tàɸàsáʃʃé:	‘boiled one’

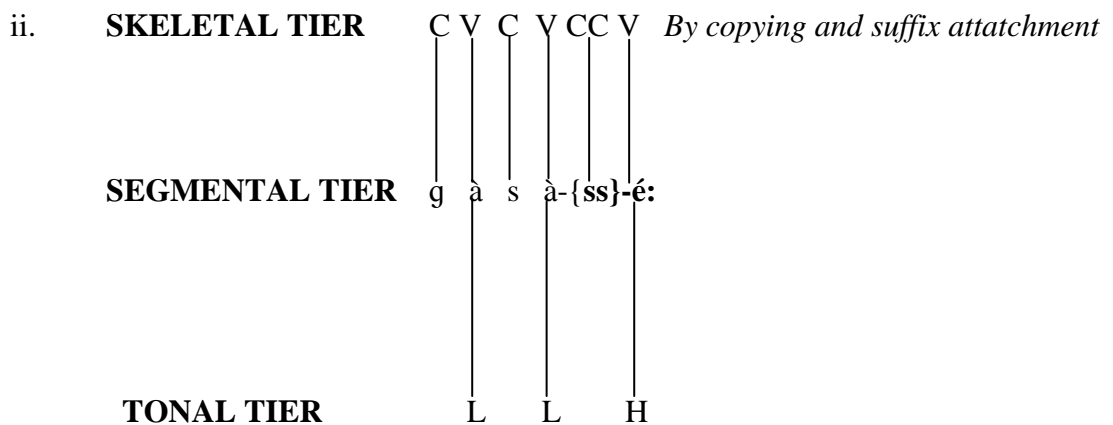
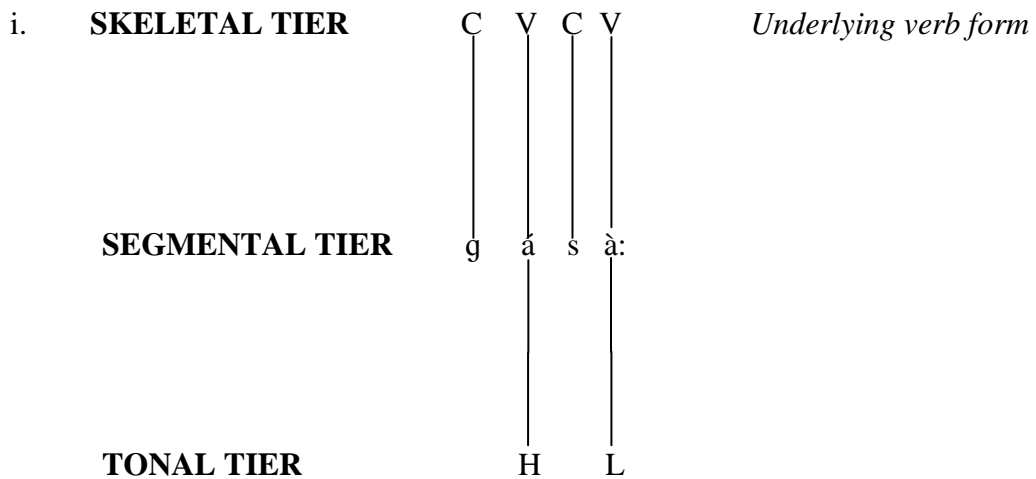
⁵⁴ The term ‘verbonominal’ was coined by Newman (1988) to refer to a noun or adjective derived from verb in Hausa.

ná.kàs-à ‘to cripple’ nà.kàs-àss-é: → nàkàsáǰǰé: ‘crippled one’

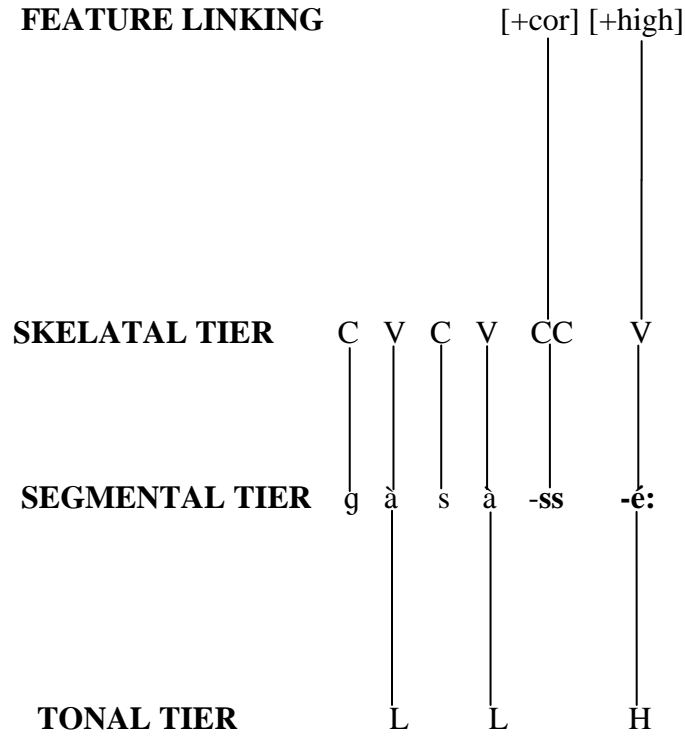
As can be seen in the data above (44), the palatalisation of the alveolar fricative [s] is attested in the derivation of deverbalised adjectives in Hausa where the said data shows a systematic transformation of basic verb forms to adjectival forms. This process resulted due to suffixal reduplicative operation which semulteneously interfaces with the process of phonological palatalisation. Therefore, the occurrence of palatalisation in the context of this reduplicative operation tends to exhibit an assimilatory process that involves sequences of adjacent consonant-vowel segments. In this operation, the affixed vowel spreads its vocalic feature [+high] to influence the preceding non-palatal coronal sibilant thereby becomes partially assimilated in the palatality which is attributed to the [+high] of the vowel segment. This kind of influence is captured in the following autosegmental analytic representations:

4.3a: **Palatalisation of s~ʃ in verb derived adjectives**

gás-à → gàs-àǰǰ-é: (gàsàss+é:) ‘roasted one’

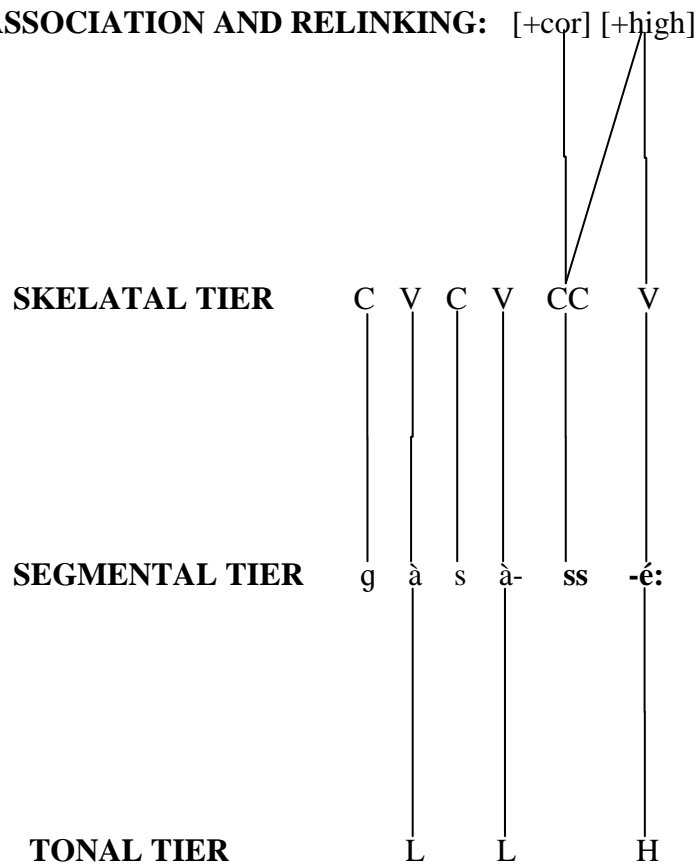


iii. **ASSOCIATION CONVENTION:
FEATURE LINKING**



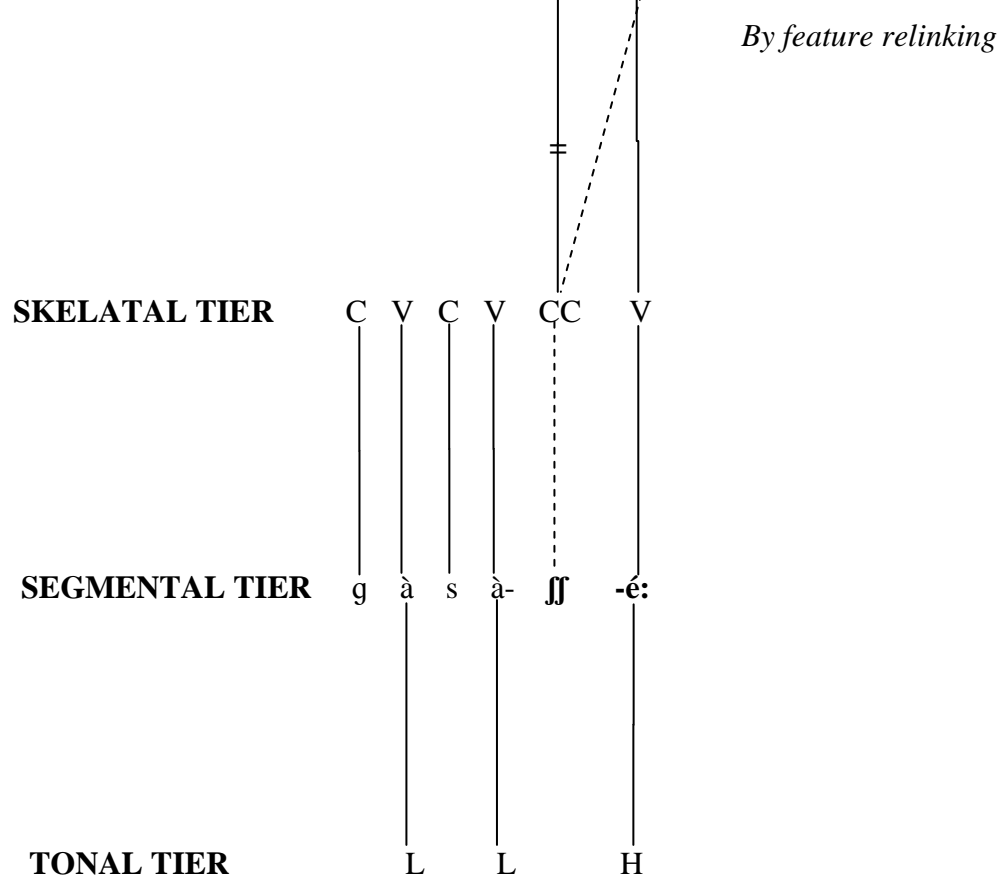
By feature linking

iv. **ASSOCIATION AND RELINKING:** [+cor] [+high]



By feature relinking

v. **ASSOCIATION AND DELINKING:** [+cor] [+high]



The autosegmental analytic representations shown in 4.3a demonstrate a clear instance of phonology-morphology interface where phonological palatalization takes place as a result of affixal attachment at the suffix position of the underlying verb forms thereby derive the said adjectival forms. This shows that the assimilatory operation affects sequences of consonant-vowel segments in the contextual position of segmental reduplication which copies the coda consonant of the root form of the underlying verb. The nature of segmental copying in respect of the aforesaid consonantal segment is employed mainly to accommodate or host the derivational affix ([-e]) that transforms verb to adjective and in that way segmental assimilation (in form of palatalisation) occurs therein. The trigger feature in the assimilation is shown to have emanated from the vowel segment where it spreads in a retrogressive direction to influence the target segment which consequently becomes palatalised.

4.2.1.2.2.2 Palatalisation of [z] in Hausa verbal derived adjectives

This section discusses another situation in Hausa language in which a voiced alveolar sibilant ([z]) changes to a palatal sibilant as a result of suffixal attachment of a

high front vowel ([e]). This operation synchronically derives the adjectival forms from their counterpart underlying verb forms. Like in the palatalisation of [s] discussed in the immediate preceding section, similar patterns of semultaneous operation are equally attested in the set of data in 45. The voiced alveolar sibilant appears as the coda segment of the root verb and is being copied or reduplicated when a suffix element is attached in the derivation process that results in the formation of deverbalised adjectives in Hausa. This operational tendency of palatalisation in the context of reduplicative segments is shown in the following data:⁵⁵

45. Underlying (Verb) forms	Surface (Adjective) forms	Gloss
gáz-à ‘tire’	gáz-ázz-é: → gázáɗɗé:	‘tired one’
tʃánz-à ‘to change’	tʃánz-àzz-é: → tʃánzáɗɗé:	‘changed one’
gúrz-à ‘to squiz’	gúrz-àzz-é: → gùrzáɗɗé:	‘squizzed one’
tʃíz-à ‘to bite’	tʃíz-ázz-é: → tʃízáɗɗé:	‘bitten one’
múrz-à ‘to twistle’	múrz-àzz-é: → múrzáɗɗé:	‘twistled one’
bárz-à ‘to grind’	bárz-àzz-é: → bàrzáɗɗé:	‘grinded one’
dá:z-à ‘to line up’	dá:z-àzz-é: → dà:záɗɗé:	‘the thing lined up’
wár.gáz-à ‘to scater’	wár.gáz-àzz-é: → wàrgázáɗɗé:	‘scatered one’
?ɪŋ.gìz-à ‘to incite’	?ɪŋ.gìz-àzz-é: → ?ɪŋgìzáɗɗé:	‘incited one’
rù.gùz-à ‘to destroy’	rù.gùz-ázz-é: → rùgùzáɗɗé:	‘destroyed one’

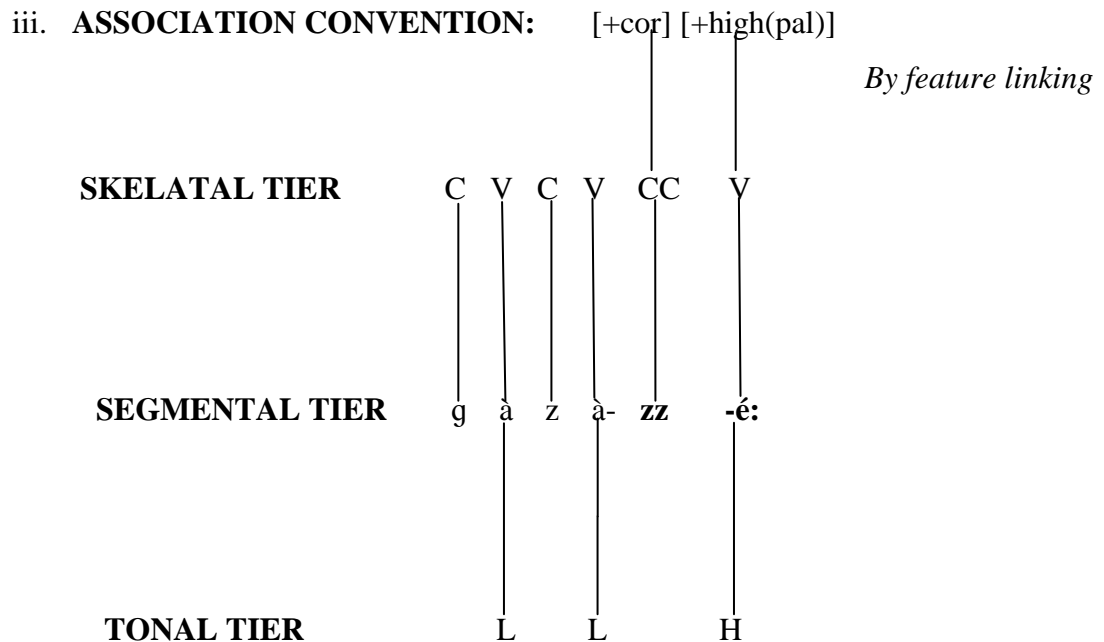
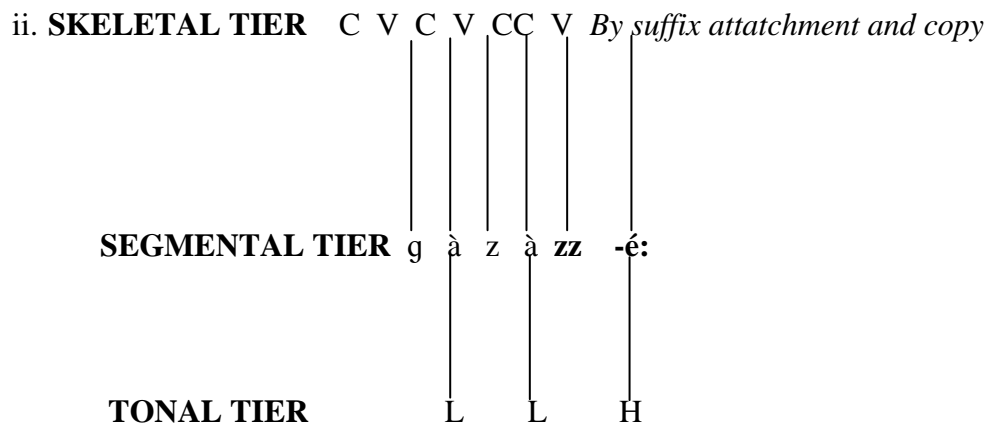
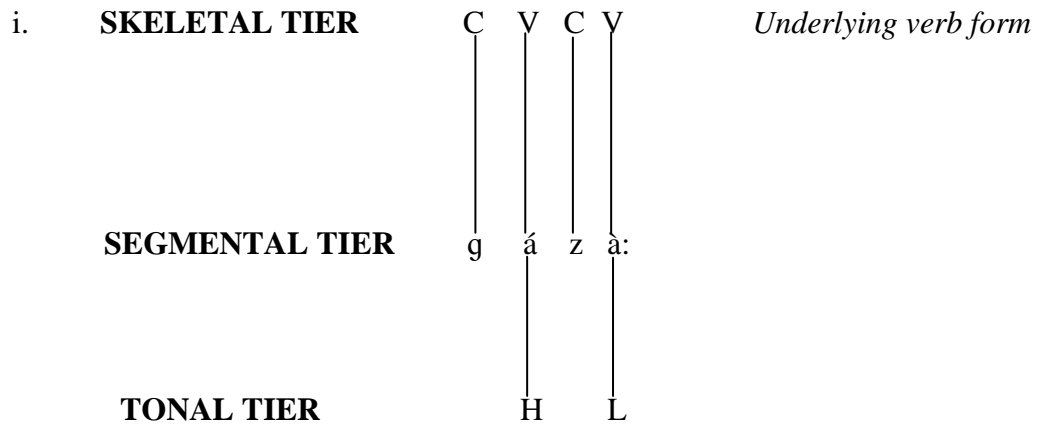
As shown in the data above (45), the nature of phonological process that occurs within the reduplicative operation in the data, which in turn results in the derivation of the surface adjectival forms, is an aspect of assimilatory process known as palatalisation. The effect of such phonological operation in the language affects sequences of voiced alveolar sibilant ([z]) and high front vowel ([e]) which occur in the suffixal position of the underlying root form. Although prosodic adjustment is not the central concern of the current analysis, it can be observed that the set of data in 45 shows a consistent adjustment of tone patterns in the surface realizations of some TBUs of the derived adjectival forms. As indicated in the data, the TBUs (vowels) of the bisyllabic underlying verb forms containing the tone patterns HL become tonally polarized in the surface forms with LH after the reduplicative and suffixal attachment. Similarly, the tone pattern (HLL) of the trisyllabic underlying verb forms with the tone patterns becomes LLH in its surface realization. The following analytic representations captured

⁵⁵ In this set of data, the verb forms **dá:zà** ‘arrange’ and **ɪŋgìzà** ‘to push somebody’, are drawn from the classical *Sakkwatançi* dialect of Hausa.

the nature of assimilatory operation affecting the consonant-vowel sequences under discussion:

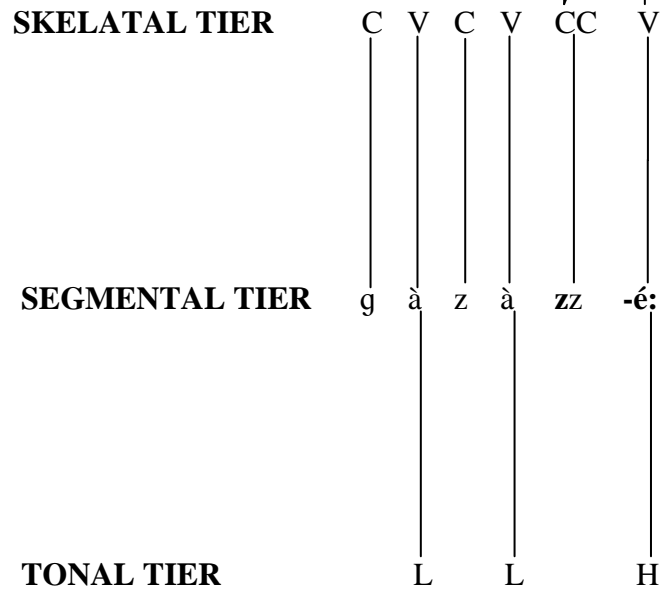
4.3b: **Palatalisation of z~ʃ in Verb Derived Adjectives**

gáz-à → gázádʒdzé: (gàz-ázz-é:) ‘tired one’



iv. ASSOCIATION AND RELINKING: [+cor] [+high(pal)]

By feature Relinking

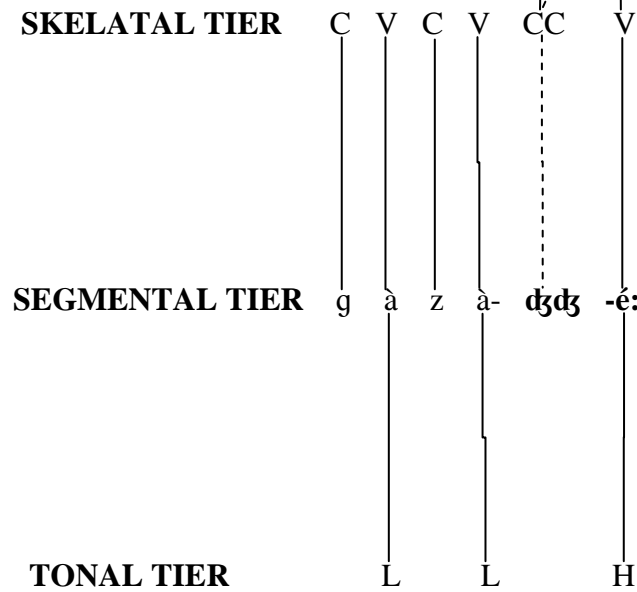


v. ASSIMILATION:

FEATURE DELINKING:

[+cor] [+high(pal)]

By feature Relinking



The autosegmental analytic representations in 4.3b show a clear case of palatal feature spreading in a retrogressive manner. It is clearly shown in the analysis that, in Hausa language, the process influences the changes in the non-palatal (coronal) alveolar sibilant. This segment appears in the reduplicative domain operation which synchronically results in its surface realised form thereby form the attested deverbalised adjectives in the language. Impliedly, the patterns in the foregoing analysis demonstrate the fact that the trigger feature in the assimilatory operation (palatalisation) is an inherent feature of vowel segment ([+high]). This vocalic feature coincides with the feature of palatality attributed to consonant segments as it occurs in the context of the operational interface. More so, the assimilation is local in nature since it involves immediate adjacent segments that appear in a transparent manner. As can be observed in the data (45) and its analyses (4.3b), the reduplicative operation affects the coda segments of the underlying verb forms. But such segments become geminated immediately they are copied and then become phonologically adjusted to the feature type of the affixed vowel in the suffix position. This obviously confirms the existence of palatalisation as the dominant phonological process in the derivation of the acclaimed adjective forms in the language.

4.2.1.2.2.3 Palatalisation of [t] in Hausa verbal derived adjectives

This section presents autosegmental analysis of assimilatory operation that involves sequences of consonant-vowel segments which occurs in the segmental reduplication that results in the formation of deverbalised adjectives in Hausa. In this process, the alveolar stop ([t]) becomes palatalised to its *palatal voiceless affricate* counterpart ([tʃ]) as a result of the contextual attachment of suffixal *high* vowel. The set of data that follows indicates that the reduplicated segment with a non-palatal feature synchronically imbibes the vocalic feature [+high] via a retrogressive feature-spreading thereby becomes palatalised in that context. Consider the data below:

46. Underlying (Verb) form	Surface (Adjective) forms	Gloss
ɸìt-á ‘to go out’	ɸìt-átt-é: → ɸìtátʃtʃé:	‘the prominent’
sát-à ‘to steal’	sát-átt-é: → sàtátʃtʃé:	‘stolen one’
tá:t-à ‘to filter’	tà:t-átt-é: → tà:tátʃtʃé:	‘filtered one’
sáit-à ‘to set’	sàit-átt-é: → sàitátʃtʃé:	‘set one’
bát-à ‘to lose’	bàt-átt-é: → b àtátʃtʃé:	‘lost thing/one’
rì.kìt-à ‘to confuse’	rì.kìt-átt-é: → rìkìtátʃtʃé:	‘confused one’

ii. **SKELETAL TIER** C V C V CC V *By suffix attachment and copy*

SEGMENTAL TIER φ ì t á tt é:

TONAL TIER L H H

iii. **ASSOCIATION CONVENTION:** [+cor] [+high(pal)]

By feature linking

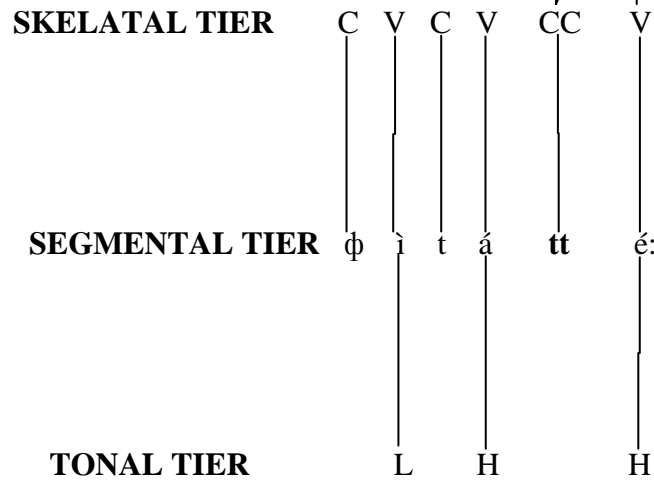
SKELATAL TIER C V C V CC V

SEGMENTAL TIER φ ì t á tt é:

TONAL TIER L H H

iv. **ASSOCIATION AND RELINKING:** [+cor] [+high(pal)]

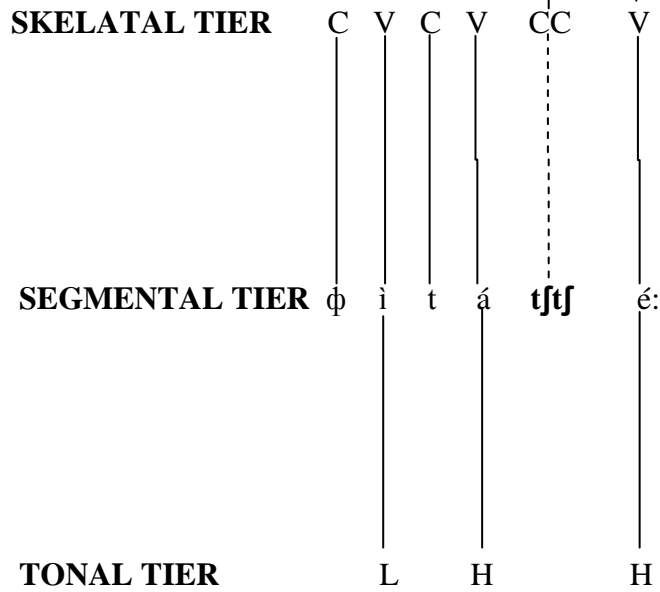
By feature relinking



v. **ASSIMILATION:**
SPREADING DELINKING:

[+cor] [+high(pal)]

By feature relinking



The analyses presented in 4.3c demonstrate the nature of partial assimilation that involves consonant-vowel sequences in the suffixal position. The trigger feature emanates from the vowel segment where it spreads in a retrogressive direction towards the target consonant segment within the domain of reduplicative operation. The target segment in this context is a voiceless non-*sibilant* alveolar which inherently lacks the said *palatal* feature. Therefore, the manifestation of palatal feature in its surface realization is attributed to the fact that the vocalic feature ([+high]) synchronically spreads to the segment and the feature is phonetically similar to a consonantal feature of *palatality*. The changes in the tone pattern between the underlying verb form and derived adjective forms as well as the gemination in the coda segment of reduplicated root coda are all different forms of phonological adjustments within the operations therein. However, they are not central to the current analysis since the focus is mainly on the nature of phonological transformation in the derivation processes that has to do with the nature or extent of phonological palatalization within the domain of operation.

4.2.1.2.2.4 Palatalisation of [d] in Hausa verbal derived adjectives

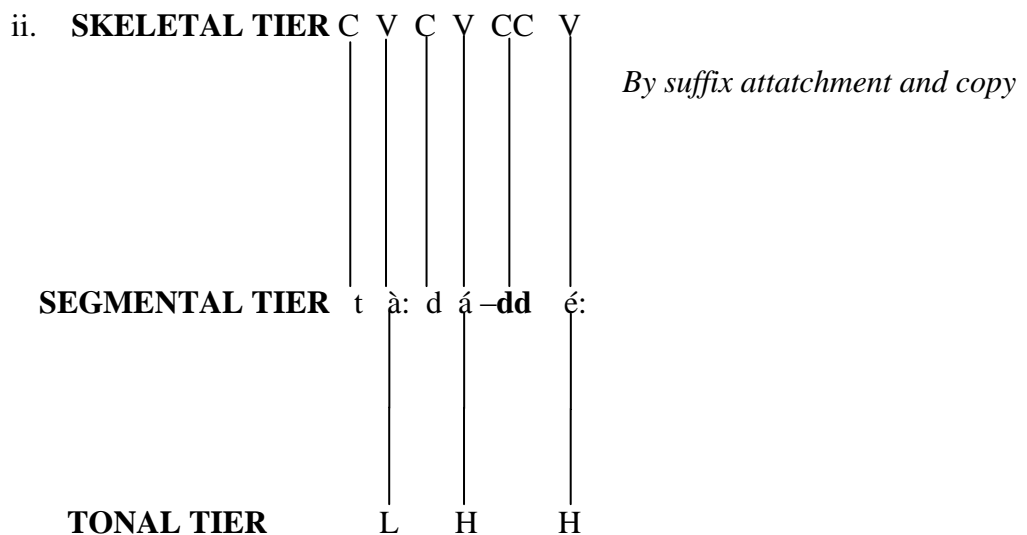
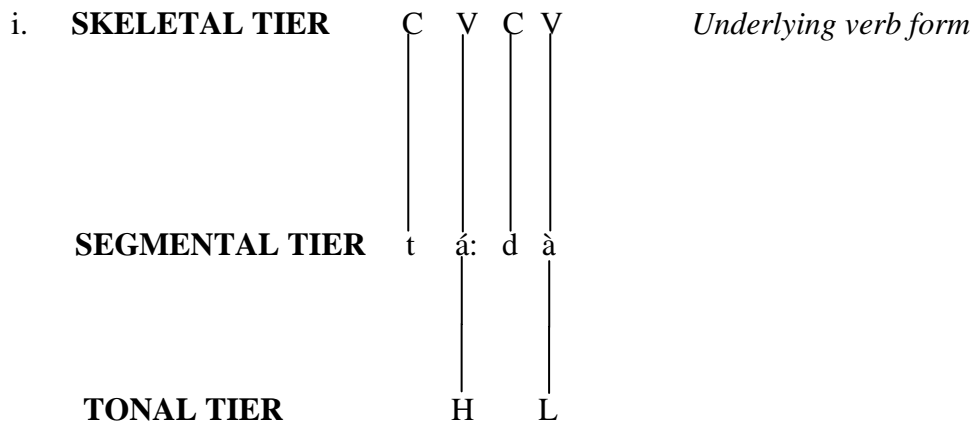
This section focuses on the analysis of palatalisation of the voiced non-sibilant alveolar ([d]) which occurs in the context of segmental reduplicative operation that results in the derivation of ‘deverbalised adjectives in Hausa. The phonological alternation of the target segment usually occurs as a result of the effect of phonological palatalization. Hausa language exhibits the tendency of this kind of assimilatory operation and it naturally occurs simultaneously with segmental reduplication, determined by a contextual suffixal vowel attachment. The set of data that follows shows a consistent palatalisation of the reduplicated coda segment occurring immediately before a suffixal high vowel ([e]):

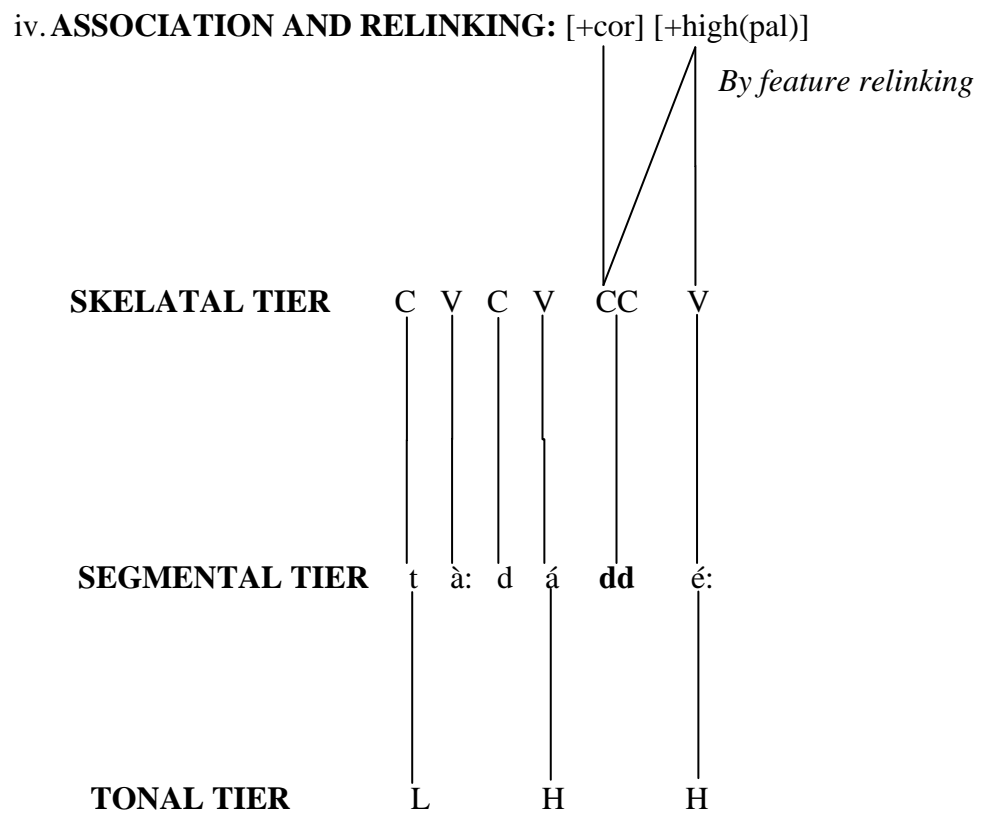
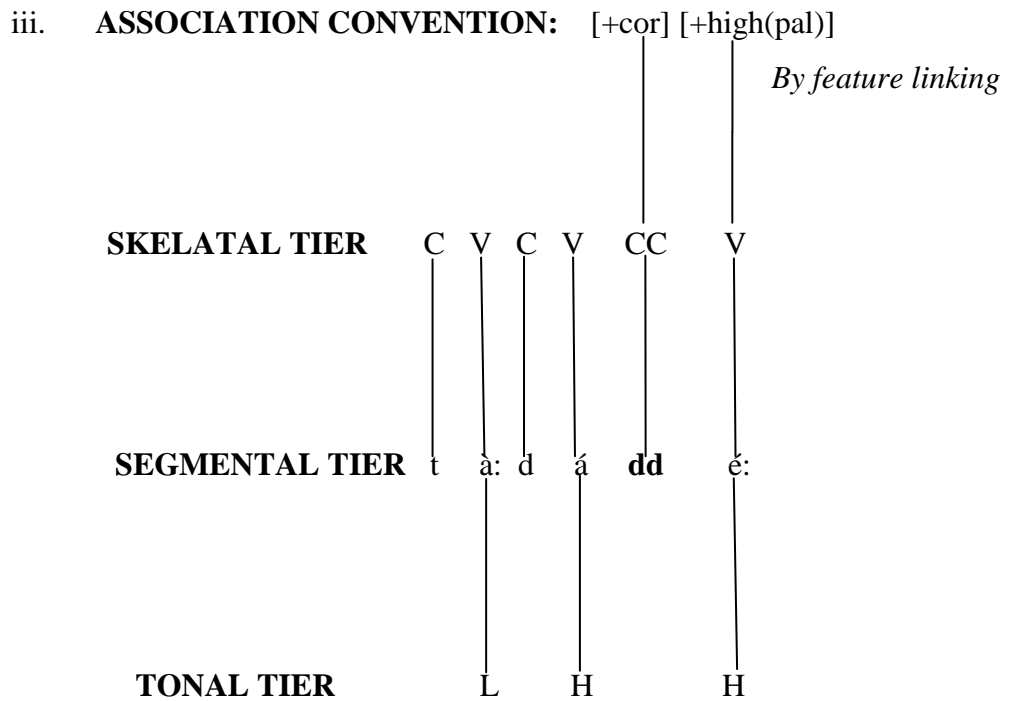
47.	<i>Underlying (Verb) form</i>	<i>Surface (Adjective) forms</i>	<i>Gloss</i>
	tá:d-à ‘to stand’	tà:d-á dd -é: → tà:dádɔ́ɔ́é:	‘stood one’
	káud-à ‘to disappear’	kàud-á dd -é: → kàudádɔ́ɔ́é:	‘disappeared one’
	said-à ‘to sell’	said-á dd -é → sàidádɔ́ɔ́é:	‘sold one’
	ká:d-à ‘to fall’	kà:d-á dd -é → kà:dádɔ́ɔ́é:	‘fallen one’
	sá:d-à ‘to level’	sà:d-á dd -é: → sà:dádɔ́ɔ́é:	‘levelled one’
	hú:d-à ‘to punch’	hù:d-á dd -é: → hù:dádɔ́ɔ́é:	‘punched one’
	maid-à ‘to return’	maid-á dd -é: → màidádɔ́ɔ́é:	‘returned one’

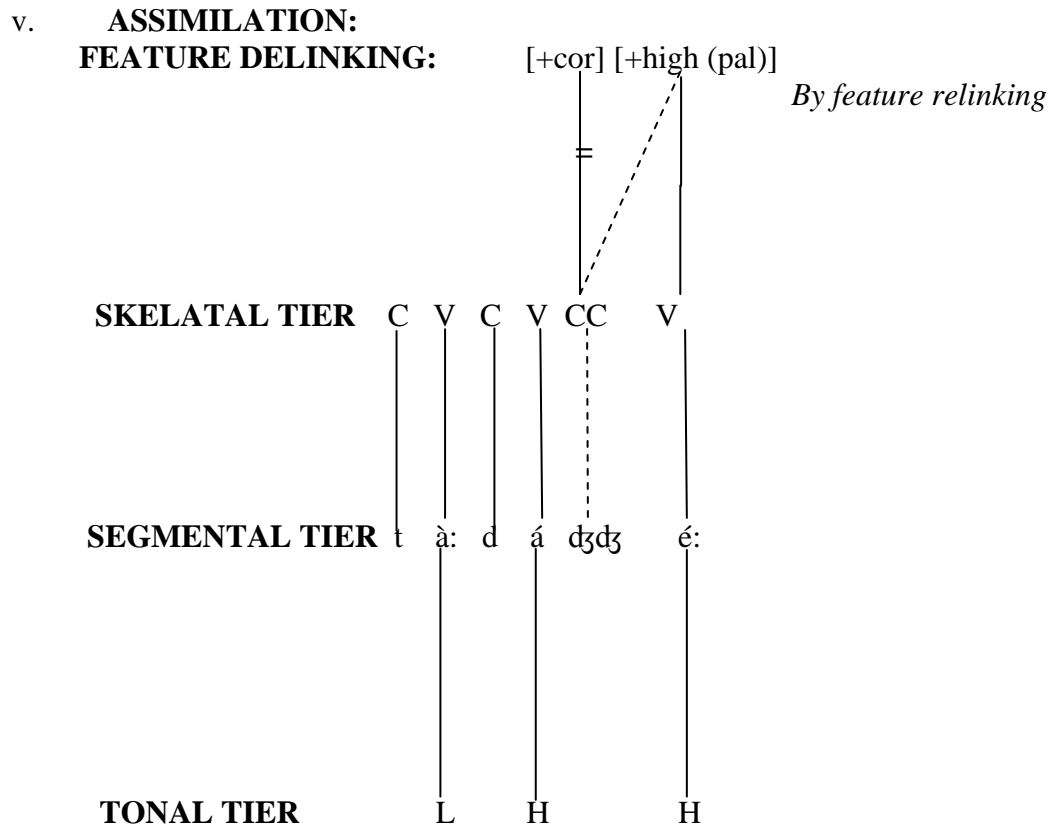
As shown in the preceding data, this phonological process of palatalization affects the segmental sequence of the non-sibilant voiced alveolar and high front vowel. The alternation is confirmed to have a restricted occurrence in the system of Hausa language. For instance, the data show that the verbal derived adjectives demonstrate a consistent assimilatory operation which obviously exhibits phonological palatalization in the context of segmental reduplicative operation. Similarly, it is also evident in the data that the trigger segmental feature in the operation is the high front vowel ([-e]). This vocalic feature emanates from the attached derivative affix segment in the suffixal position. In the same vein, the target segment in this context is a voiced non-sibilant alveolar ([d]) which is the coda segment of the reduplicated root CVC that appears in the domain of palatalization. Moreso, the segmental alternation in these forms of adjectives exhibits the tendency of retrogressive palatal feature spreading as captured in the following autosegmental analyses:

4.3d: **Palatalisation of d-ɗ in Verb Derived Adjectives**

tá:d-à → tà:d-áɗɗ-é: ‘stood one’







The analytic representations in 4.3d show an obvious process of phonological palatalisation which transforms the underlying verb forms to adjectival forms, often realized at the surface level. This transformational process involves many other processes which include segmental reduplication and suffixal attachment that concurrently occur with assimilatory operation (realized as palatalisation in this context) within the domain of the interfaced operations. As noticed in the foregoing analysis, all these processes have some relevant effects in the general modification of the surface forms. Nevertheless, the effect of palatalisation appears to be more prominent in the realization of the said forms since it involves segmental feature spreading which is counted as an assimilatory operation. The feature of the vowel segment which is basically associated with palatality when imbibes by a consonantal segment is actually the main trigger that spreads towards the backward direction thereby causing the target coronal non-sibilant alveolar to be palatalised.

4.5 Summary of Chapter Four

This chapter presented data on Hausa reduplicated nouns and their autosegmental analytic descriptions. The analyses demonstrate features that trigger the process of assimilation within the reduplicative formation of such nominal morphosyntactic forms in Hausa. The chapter further discussed, in analytic terms, the

nature of segmental alternations in the Hausa derived deverbalised adjectives which synchronically results in palatalisation of *alveolar obstruent* segments to their corresponding palatal segments.

CHAPTER FIVE

SEGMENTAL ASSIMILATION IN HAUSA REDUPLICATED VERBS

5.1 Introduction

This chapter presents analytic descriptions of assimilatory operation which systematically occur within the reduplicative formation of the Hausa pluractional verbs. As Newman (2012) puts it, “pluractional verbs are verbal forms that are commonly indicated by reduplication” which usually exhibit the tendency of total or partial operation. Similarly, the kind of reduplication that often results in the formation of these form of verbs is generally described in the literature (Mithun 1988, p. 218; Dahl 1999) as prefixal morphological operation and is always being accompanied by certain phonological adjustments (often in form of segmental assimilation). The autosegmental analysis here is restricted to the nature and dimension of segmental assimilation involving sequences of adjacent onset segments of the root CVC and coda segments of the reduplicated CVC in the contexts of reduplication. In exploring these possibilities, both total and partial assimilation will be accounted for.

5.2 Analysis of segmental assimilatory operations in Hausa RVs

This section is committed to presenting analyses of segmental assimilatory operation occurring within the verbal reduplicative process that results in the formation of what are technically called ‘pluractional verbs’ in the literature of Hausa grammar (Newman 2000; Jaggar 2001). The analysis shows descriptive operations of total and partial segmental assimilation affecting obstruent and sonorant segments which are basically realized in form of place and manner feature-spreading mechanism.

5.2.1 Obstruent-obstruent total assimilation in Hausa pluractional verbs

As previously discussed in chapter two, pluractional verbs (PVs) in Hausa are basically categorized into ‘active’ and ‘frozen’ (vestigial)⁵⁷. This section, therefore, focuses on analytic description of assimilatory operation in the reduplicative formation

⁵⁷ According to Newman (1989, 2000), an ‘active pluractional verb’ is a form of verb in which the root exists as an independent functional unit in the Hausa verbal system, without depending on the reduplicative CVC morpheme. Whereas, ‘frozen’ or ‘vestigial’ verb is a form of pluractional verb in which its base form cannot function substantially in isolation.

of pluractional verbs in Hausa. This form of verbs largely exhibits the tendency of total segmental assimilation in the context of their reduplicative formation in the language. The nature of this assimilatory operation in Hausa is such that involves sequences of obstruent-obstruent and sonorant-obstruent segments. In the case of obstruent-obstruent sequence, the assimilation affects stop-stop, stop-fricative and fricative-stop/fricative adjacent segments in the context of reduplication that synchronically results in the formation of the said ‘pluractional verbs’.

5.2.1.1 Total assimilation involving sequences of stop+stop in PVs

This section presents data and their autosegmental analytic representations of total assimilatory operation involving the coda stops of the reduplicated CVC and the onset stops of the root CVC within the context of verbal reduplication in Hausa. Consider the set of data that follow:

48.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
	bàk-à	bá k bàk-à	bá bb àkà:	‘to roast’
	dàk-à	dá k dàk-à	dá dd àkà:	‘to pound severally’
	bùg-à	bú g bùg-à	bú bb ùgà:	‘to beat severally’
	tùk-à	tú k tùk-à	tú tt tùkà	‘to drive repeatedly’
	tàk-à	tá k tàk-à	tá tt tàkà	‘to step on sth’
	dàg-à	dá g dàg-à	dá dd dàgà	‘to punch repeatedly’
	gìd-à	gí d gìd-à	gí gg ìdà	‘to publicise a lot’
	dìg-è	kí.dí g dìg-è	kí.dí dd ìgè	‘to ascertain’
	kàg-à	ká g kàg-à	ká kk kàgà	‘to fix severally’
	kàd-à	ká d kàd-à	ká kk kàd-à	‘to fall repeatedly’
	gít-tà	gít g ít-tà	gít gg ittà	‘to place across’
	dàk-è	dá k dàk-è	dá dd dàkè	‘to mash something’
	tàk-è	ɸá.tá k tàk-è	ɸá.tá tt tàkè	‘to push away’

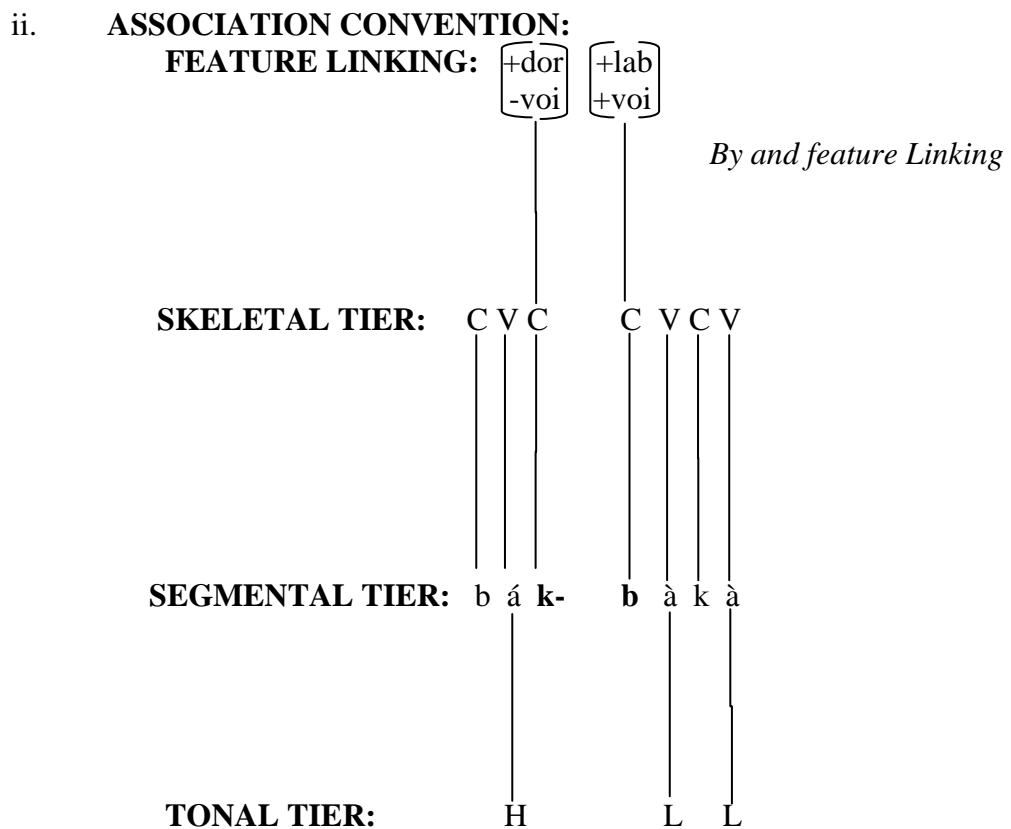
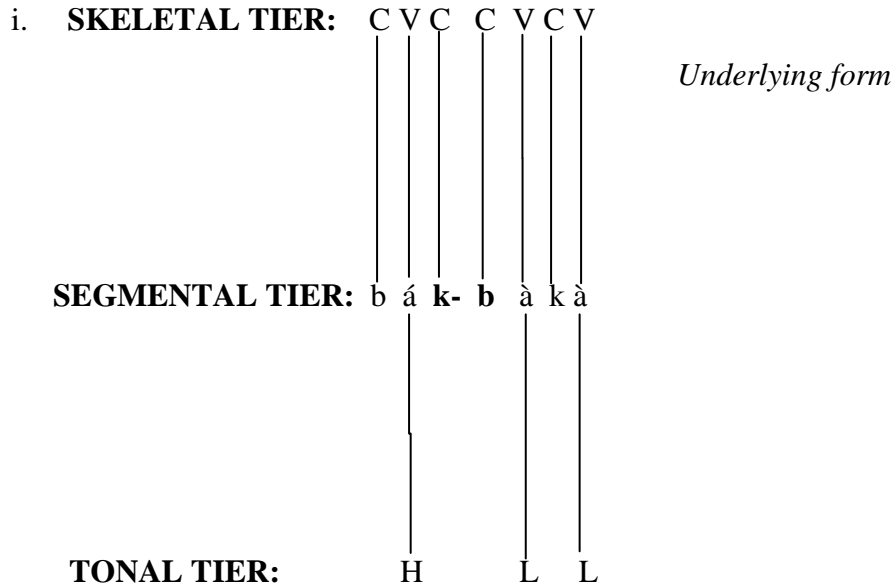
The set of Hausa data above (48) demonstrates an obvious tendency of total assimilation affecting the adjacent segments at the edges of reduplicated verb items in the context of partial reduplication. As shown in the data, the affected segments in the assimilatory operation appear variously in the class of labial, coronal and dorsal consonants, which indicate that $[\pm dor]$ and $[\pm cor]$ are the key trigger and target features that synchronically determine the nature of feature spreading in the formation of

pluractional verbs in Hausa. This operation is generally described as ‘homorganic’ assimilation as it is captured in the following autosegmental analytic representations:

5.1a: **Stop+stop total assimilation in pluractional verbs**

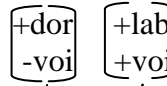
- i. **bák-bàk-à** → **bábbàkà:** ‘to roast’
- ii. **dák-dàk-à** → **dáddàkà:** ‘to pound severally’
- iii. **búg-bùg-à** → **búbbùgà:** ‘to beat severally’

5.1a (i): **bák-bàk-à**



iii. ASSOCIATION CONVENTION

FEATURE RELINKING:



By feature Relinking

SKELETAL TIER:



SEGMENTAL TIER:

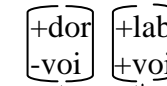


TONAL TIER:



iv. ASSIMILATION

FEATURE SPREADING:



Byspreading and Delinking

SKELETAL TIER:



SEGMENTAL TIER:



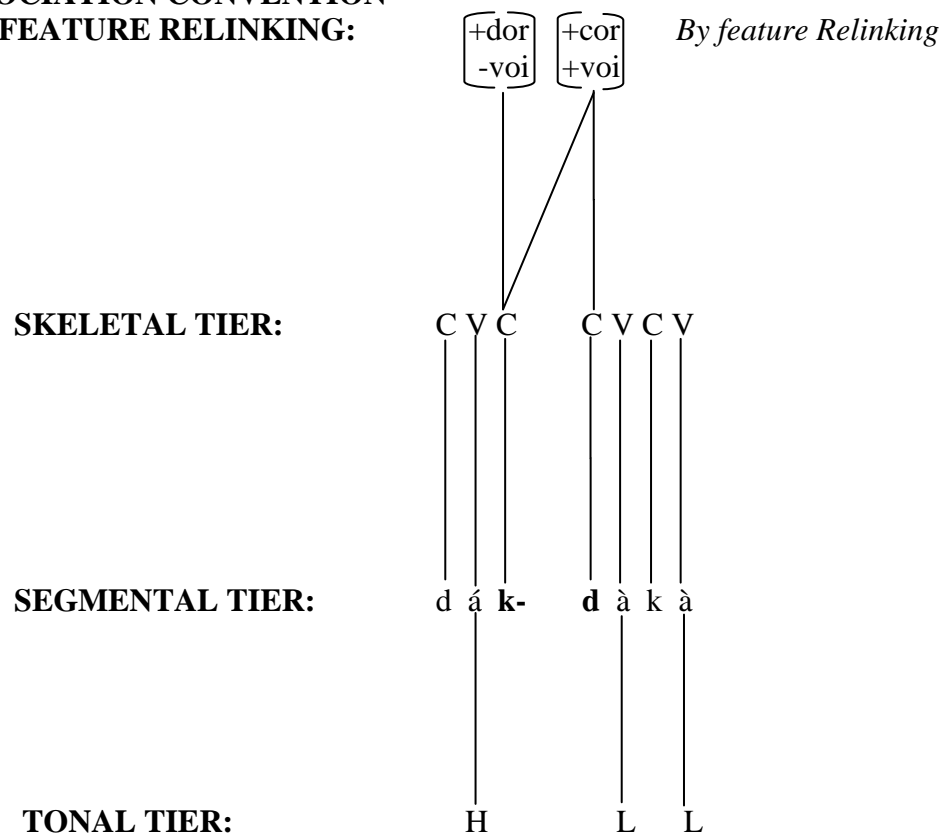
TONAL TIER:



The autosegmental analysis in 5.1a describes a total segmental assimilation that involves a sequence of *dorsal* and *labial* obstruent in the context of the target verbal reduplication in Hausa. The analysis shows more than one feature as ‘trigger’ and ‘target’, where the affected features are ‘*laryngeal*’ ([±*voi*]) and ‘*place*’ ([±*lab*]). The assimilatory operation in the reduplicative process is synchronically triggered by the [+F] class of the said features via a retrogressive spreading. In this way, it influences the reduplicated CVC voiceless velar coda ([**k**]) to totally assimilate in those features and as a result changes to voiced bilabial stop. The second category of this kind of assimilation is demonstrated below:

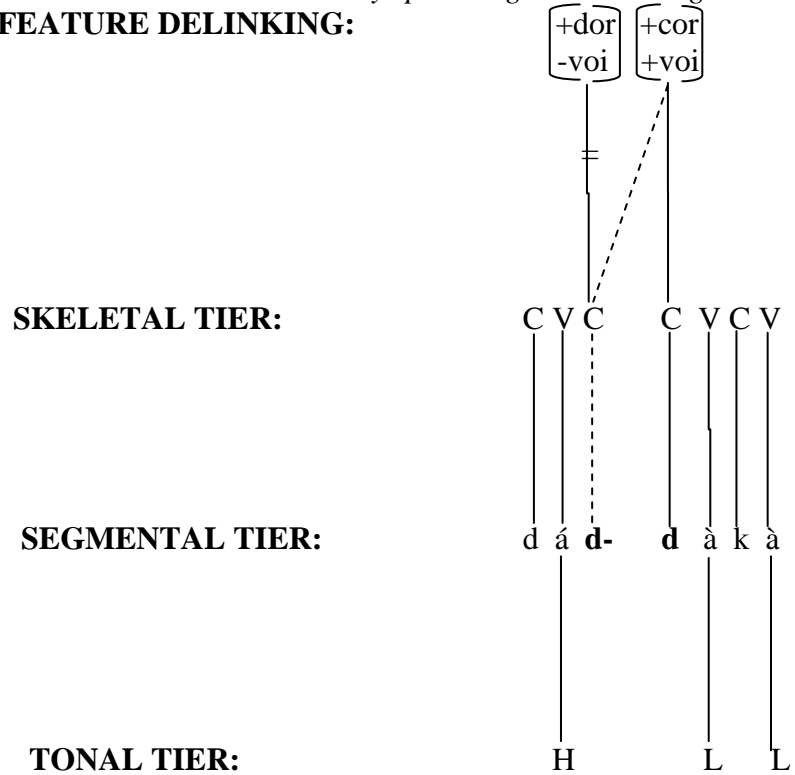
5.1a(ii): dá**k**-dàkà

i. ASSOCIATION CONVENTION
FEATURE RELINKING:



ii. ASSIMILATION *By spreading and delinking*

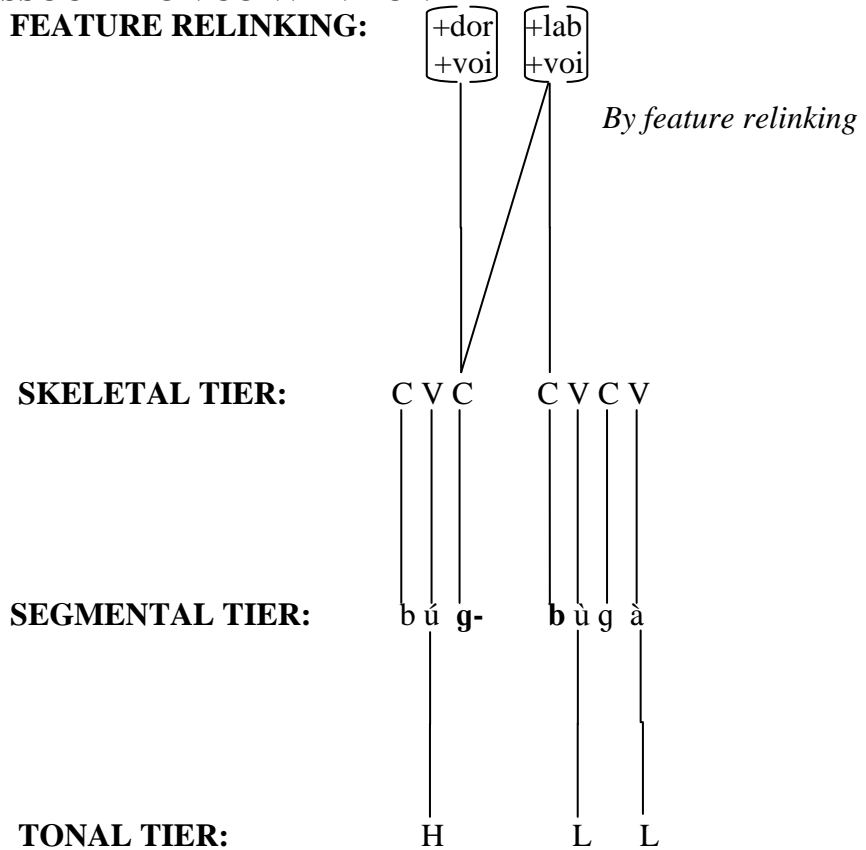
FEATURE DELINKING:



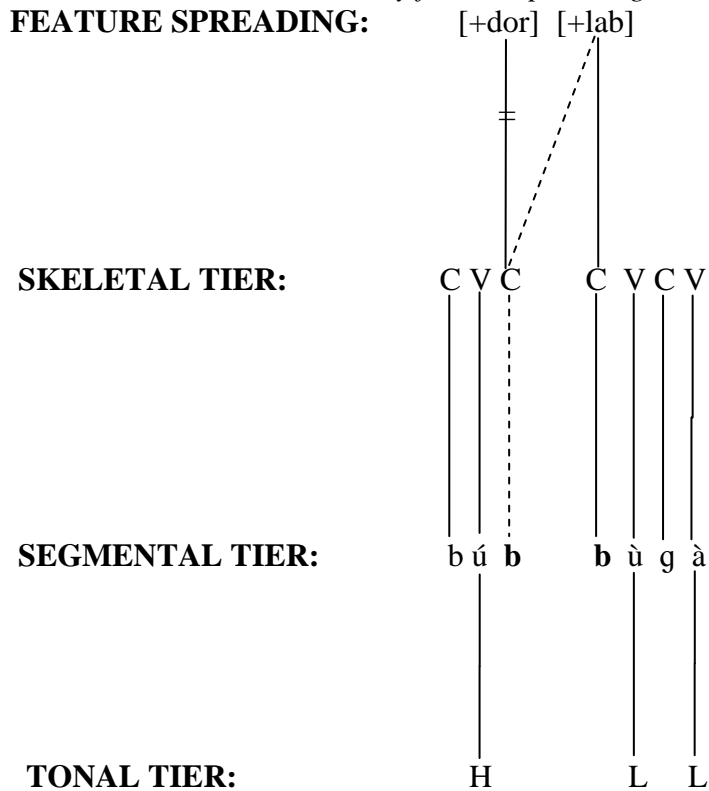
In a quite similar perspective, the autosegmental analysis in 5.1a(ii) demonstrates certain level of similarity with the pattern of assimilatory operation shown in 5.1a(i). In this case, the spreading of coronal feature of alveolarity is retrogressive in nature, and in that way, it influences the preceding adjacent velar segment which completely changes to alveolar obstruent with similar manifestation of voicing feature ([+voi]). In this regard, the analysis explicitly shows how two features ([cor] and [voi]) synchronically trigger the operation of assimilation that wholly influences the target segments in the context of the acclaimed verbal reduplication. In a much related way, consider the analytic representations that follow:

5.1a(iii): búg-bùg-à

i. ASSOCIATION CONVENTION
FEATURE RELINKING:



ii. ASSIMILATION
FEATURE SPREADING:



The autosegmental analysis of assimilation in the reduplicative formation of pluractional verbs in Hausa, as shown in 5.1a (iii), reveals a synchronic assimilatory operation which occurs in a slightly different way compared with the preceding analyses in 5.1a(i) and 5.1a(ii). In view of the assimilatory patterns in 5.1a (i-iii) above, it is evident that the nature of assimilation affects the place feature of alveolarity (in the case of 5.1a (i) and 5.1a (ii), respectively) and labiality in 5.1a (iii). However, based on the representation in 5.1a (iii), the laryngeal feature ([±voi]) appeared to be redundant since it has no effect in triggering the assimilation that affected the adjacent segments in the context of reduplicative formation that transforms the said category of verbs in the Hausa language. As indicated in the analysis, the target segment in the assimilatory operation is the coda of the reduplicated CVC, which is a voiced velar obstruent, preceding another voiced segment at the onset position of the root CVC.

5.2.1.2 Total assimilation involving sequences of stop+fric in PVs

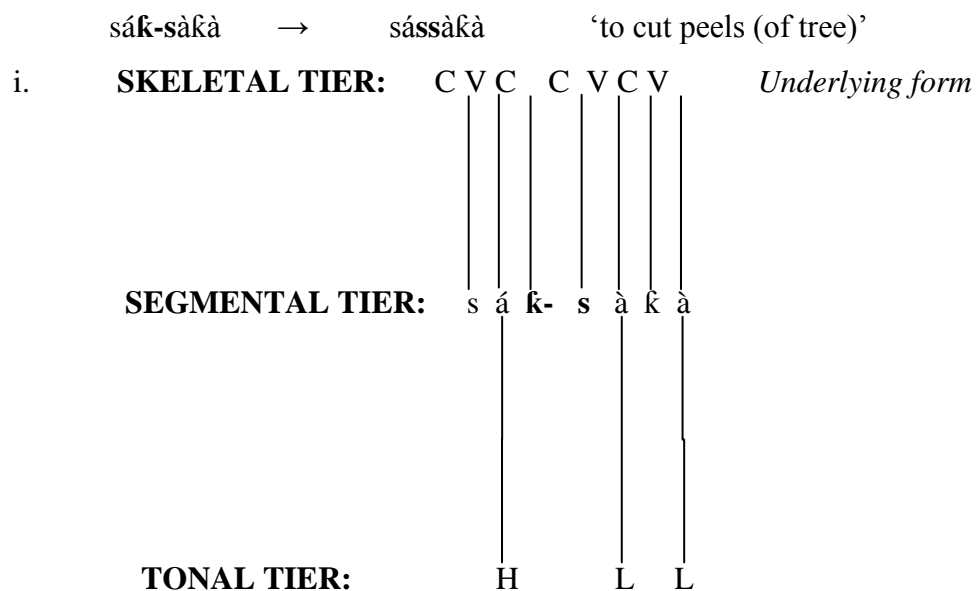
This section presents autosegmental analyses of segmental assimilation involving sequences of stop and fricative segments in the reduplicative process that naturally form ‘pluractional verbs’ in Hausa. As pointed out in the preceding analytic discussion (5.2.1.1), the nature and patterns of assimilatory operation in this context is total, and in the same manner, affects only the preceding segments within the reduplicative context. The data that show this kind of assimilatory operation demonstrate certain tendency of manner feature spreading in a retrogressive direction. The trigger features in the context adjacent sequence of segments influences the target features therein and, as a result of that, the target segments become totally assimilated in the manner feature of the abutting adjacent segments within the context of reduplicative formation. Consider the data that follow:

49.	<i>Underlying form</i>	<i>Reduplicated forms</i>	<i>Surface form</i>	<i>Gloss</i>
	sàk-à	sáksàk-à	sássàkà	‘to cut peels (of tree)’
	ɸìg-è	ɸígɸìg-è	ɸíɸɸìgè	‘to remove feather’
	zàg-è	zágzàg-è	zázzàgè	‘to pour down from a sack’
	sùk-è	súksùk-è	sússùkè	‘to thresh grain’
	zùb-à	zúbzùb-à	zúzzùbà	‘to put repeatedly’
	ʃìg-è	ʃígʃìg-è	ʃíʃʃìgè	‘to interfere’
	zùk-è	zúkzùk-è	zúzzùkè	‘to suck repeatedly’
	ʃèk-è	ʃékʃèk-è	ʃéʃʃèkè	‘to winnow repeatedly’

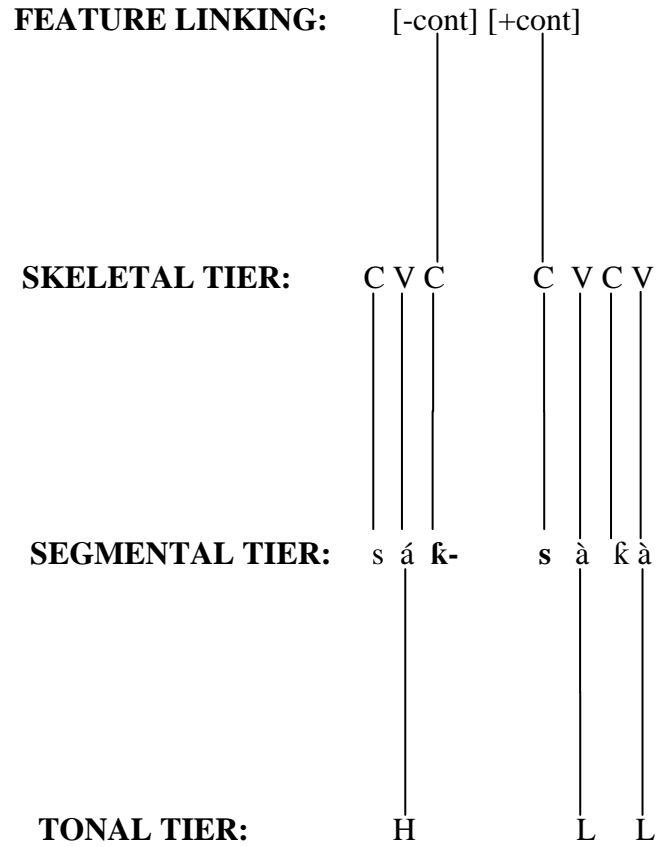
fùk-à	fúkfúk-à	fúffúkà	‘to plant repeatedly’
fàk-à	fákfák-à	fáffàkà	‘to inhale bit by bit’
fàt-à	fátfát-à	fáffàt-à	‘to outline plan repeatedly’

As mentioned earlier, the set of data in 49 shows a systematic operation of total segmental assimilation that involves sequences of adjacent stop-fricative segments within the context of pluractional verb reduplication in Hausa. It shows that the stop segments consistently appear at the coda positions of the reduplicated CVC elements, which clearly indicate that is a synchronic copy of the root CVC coda. But the assimilatory influence obviously affects the adjacent coda of the reduplicated CVC and the onset of the root CVC, which are variously in form of *bilabial* stop, *alveolar* stop and *velar* stops in the case of the target segments in the assimilatory operation. Similarly, the trigger segments are variously in form of *bilabial fricative*, *alveolar fricative* and *palatal fricative*, in that order. Consider the following autosegmental analyses which typically demonstrate the patterns of structural changes in the assimilatory operation that usually transforms the category of verbs under discussion:

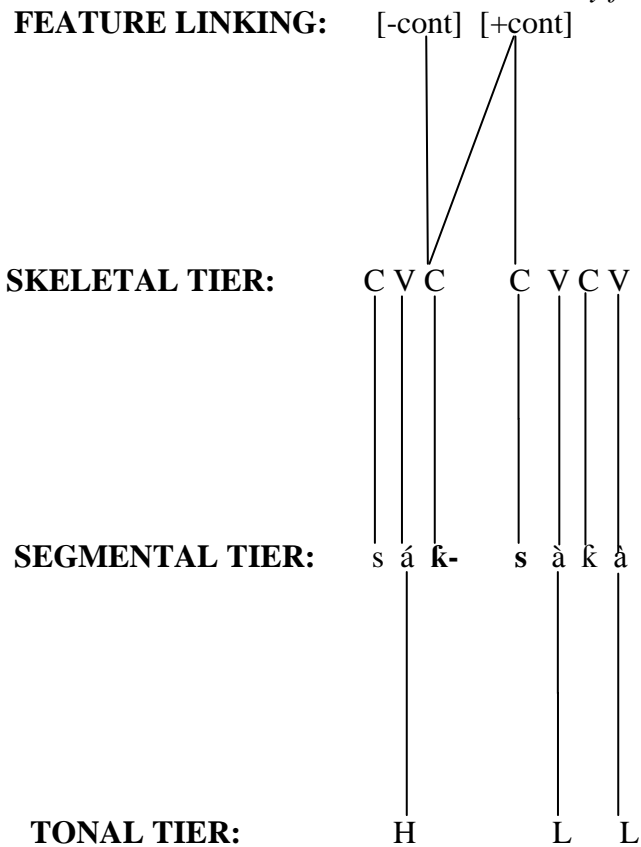
5.1b(i): **Stop+Fric Total Assimilation in Pluractional Verbs**

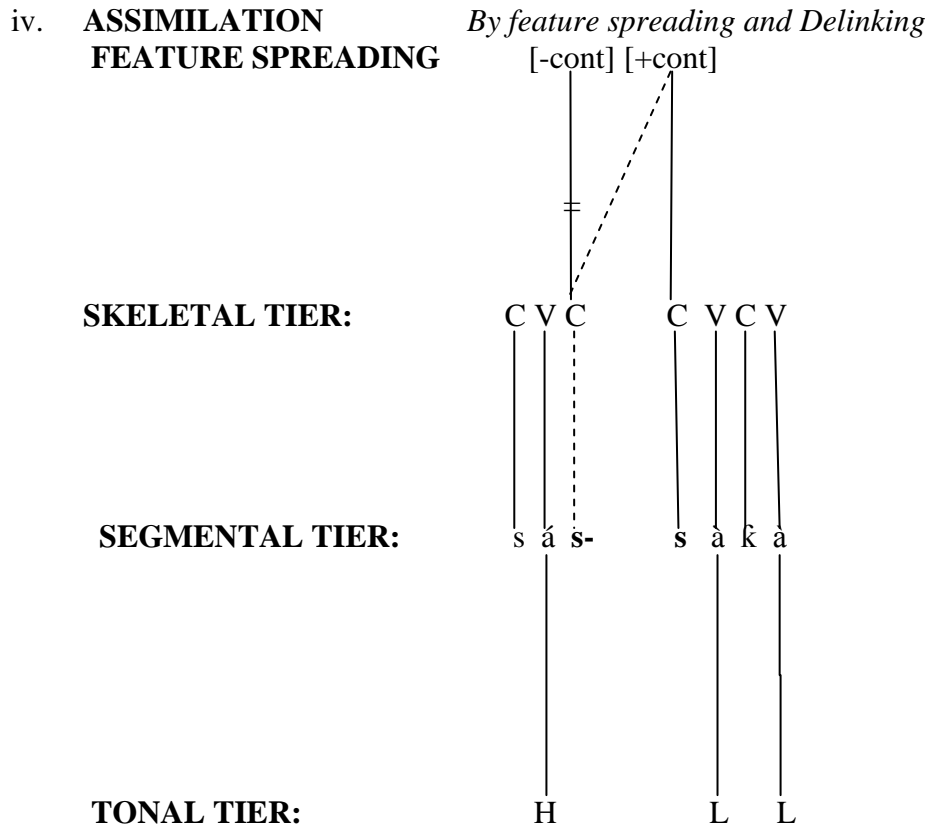


ii. **ASSOCIATION CONVENTION** *By feature Linking*



iii. **ASSOCIATION CONVENTION** *By feature Relinking*



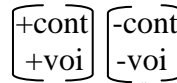


The analytic representations in 5.1b (i-iv) indicate an instance of total segmental assimilation which synchronically occur within the reduplicative formation of pluractional verbs in Hausa. This assimilatory operation involves sequences of obstruent (*stop* and *fricative*) segments. The nature of assimilation demonstrated in the analysis appears in the pattern of manner feature spreading ($[\pm cont]$), where the trigger segments are consistently fricatives, marked by laryngeal feature $[\pm voice]$. And, in the same way, the target segments within the assimilatory context appear consistently in form of stops, marked by laryngeal feature ($[\pm voice]$). Therefore, based on the data shown in 49, it is clear that in Hausa, whenever the preceding target segment is classified as *voiced*, then it must become influenced by the laryngeal feature of the following trigger segment provided that it appears as *voiceless* and, vice versa. This possibility will automatically make the process of retrogressive feature spreading to involve not only the manner feature but also voicing feature in a simultaneous assimilatory operation. This situation is captured in the analytic autosegmental representations that follow:

5.1b(ii): $\phi i g - \phi i g - \grave{e} \rightarrow \phi i \phi \phi i g \grave{e}$ 'to remove feather repeatedly'

i. ASSOCIATION CONVENTION

FEATURE RELINKING:



By feature Relinking

SKELETAL TIER:



SEGMENTAL TIER:

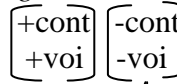


TONAL TIER:



ii. ASSIMILATION *By spreading and Delinking*

FEATURE SPREADING:



SKELETAL TIER:



SEGMENTAL TIER:

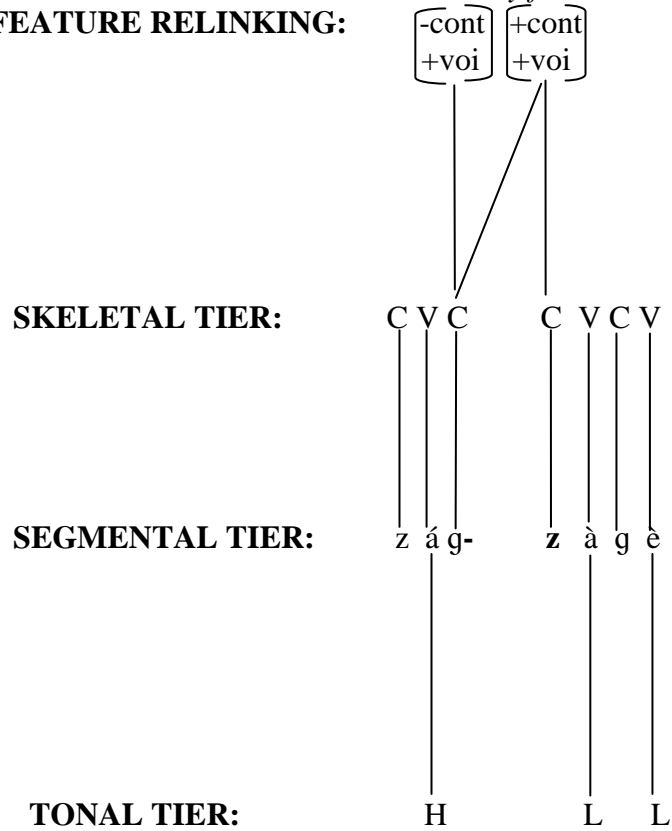


TONAL TIER:

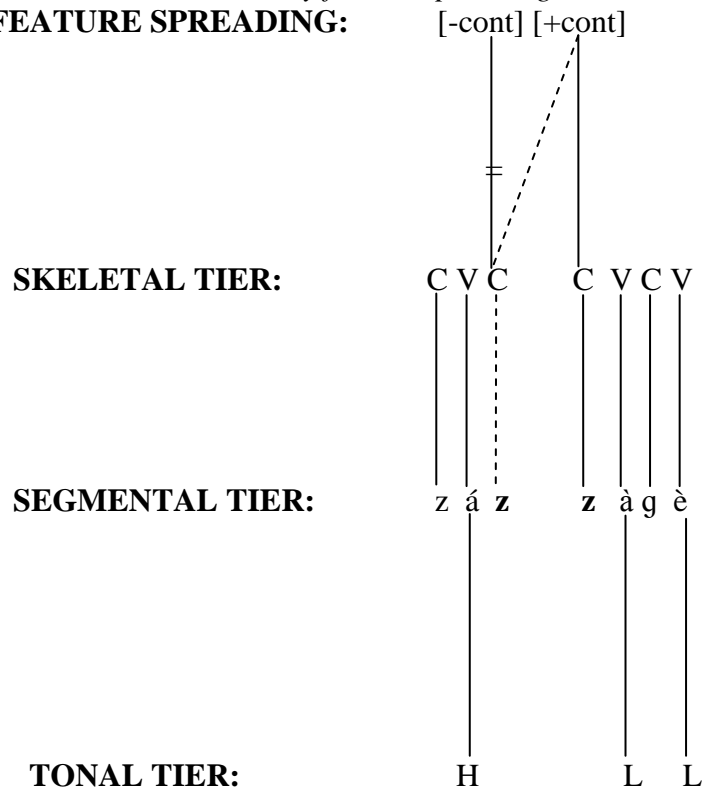


5.1b(iii): zág-zàgè → zázzàgè ‘to pour down from a sack’

i. ASSOCIATION CONVENTION
FEATURE RELINKING: *By feature Relinking*



ii. ASSIMILATION *By feature spreading and Delinking*
FEATURE SPREADING: [-cont] [+cont]



The two autosegmental analyses in 5.1b (ii) and 5.1b (iii) explicitly demonstrate the nature of assimilatory patterns involving both *manner* and *laryngeal* features in the context of assimilation that synchronically results in forming the Hausa pluractional verbs. It is shown that sequences of obstruent-obstruent (*stop-fricative*) segments are affected in the reduplicative operation. In the first analytic representation (5.1b (ii)), the affected sequence of obstruent segments contain [+voice] and [-voice] features in the coda position of the reduplicated CVC and in the onset position of the root CVC, respectively. Similarly, since the nature of assimilation is total, coupled with the fact that the dominant trigger feature in the operation lies on the mannerism of the airflow ([±cont]), the assimilation of the voicing feature naturally becomes less prominent in the context of this assimilatory operation. In the second analytic representation (5.1b (iii)), however, the two adjacent obstruent (*stop-fricative*) segments in the context of assimilation share similar voicing feature ([+voice]). As a result of that, the *laryngeal* feature does not count as a ‘trigger’ in such contextual assimilatory operation. This enable the triggering effect to be associated with the *manner* feature ([+cont]) and onsequently, determines the feature spreading that usually results in the structural change that transforms the pluractional verbs in that context.

5.2.1.3 Total assimilation involving sequences of fric+stop/fric inPVs

This section focuses on the nature of total assimilation that synchronically affects the sequence of fricative obstruents that appear in the coda positions of the reduplicated CVC and stop obstruents in the onset positions of the root CVC in Hausa pluractional verbs. The sets of data that follow show a systematic operation of segmental feature assimilation attested to be total and anticipatory in nature:⁵⁸

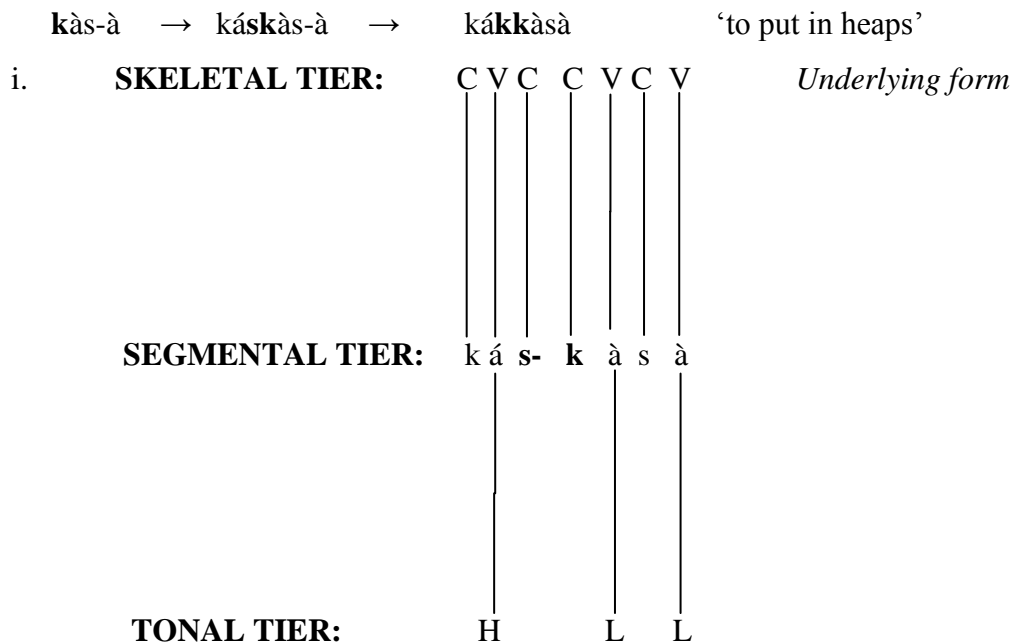
50.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
i.	kàs-à	ká sk às-à	ká kk àsà	‘to put in heaps’
	gàs-à	gá sg às-à	gá gg àsà	‘to roast repeatedly’
	kàϕ-à	ká ϕk àϕ-à	ká kk àϕà	‘to set up many things’
	bùs-à	bú sb ùs-à	bú bb ùsà	‘to blow repeatedly’
	dàs-à	dá sd às-à	dá dd àsà	‘to transplant repeatedly’
	kìϕ-à	kí ϕk ìϕ-à	kí kk ìϕà	‘to turn sth upside down’

⁵⁸ It should be clarified here that two of the pluractional forms in the set of data in 5a (**búbbùsà** ‘to blow repeatedly’ and **dáddàzà** ‘to put things in a row’) are never found in the eastern dialects of Hausa since they are all common pluractional forms in *Sakkwatanci* dialect.

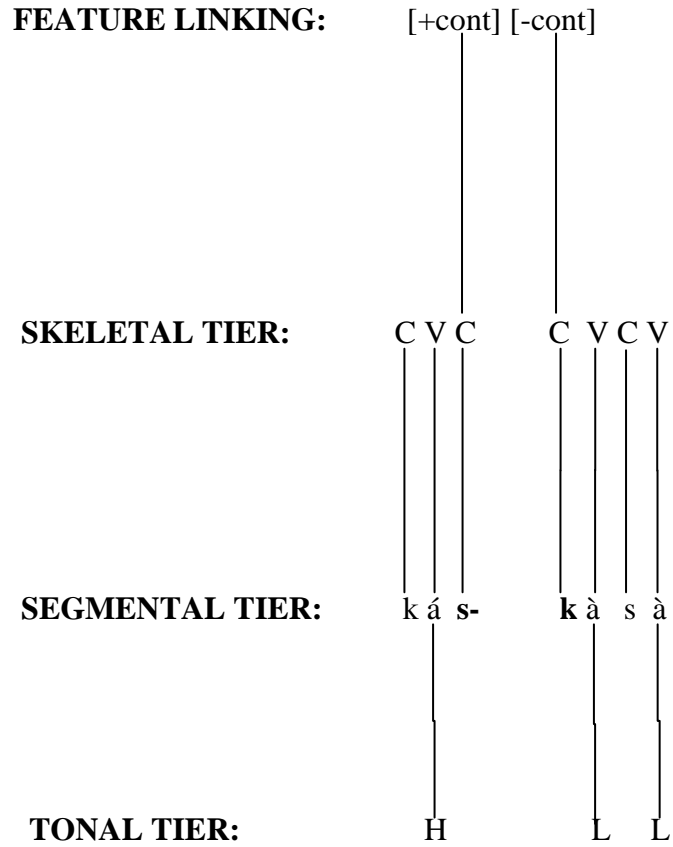
	kàf-è	káƙkàf-è	káƙƙàfè	‘to kill repeatedly’
	dàz-à	dázdàz-à	dádddàzà	‘to put things in a row’
ii.	ɸàs-à	ɸásɸàs-à	ɸáɸɸàsà	‘to break severally’
	ʃàɸ-à	ʃáɸʃàɸ-à	ʃáɸɸàɸà	‘to rub repeatedly’
	ɸès-à	ɸésɸès-à	ɸéɸɸèsà	‘to spray everywhere’
	sòs-à	sóssòs-à	sósssòsà	‘to scratch repeatedly’

The set of data in 50 appear in twofold: sequences of *fricative-stop* and that of *fricative-fricative* segments in the context of the said verbal reduplication. As can be seen, the data demonstrate patterns of the affected segments which exhibit the tendency of total retrogressive assimilatory operation. The two operational possibilities share similar dimension in their contextual realisation. As mentioned previously, the trigger segments are the onset of the root CVC in both 50 (i-ii) while the target segments are consistently the coda of the reduplicated CVC. The autosegmental analysis of assimilatory operation exhibited in the data is captured in the following representations:

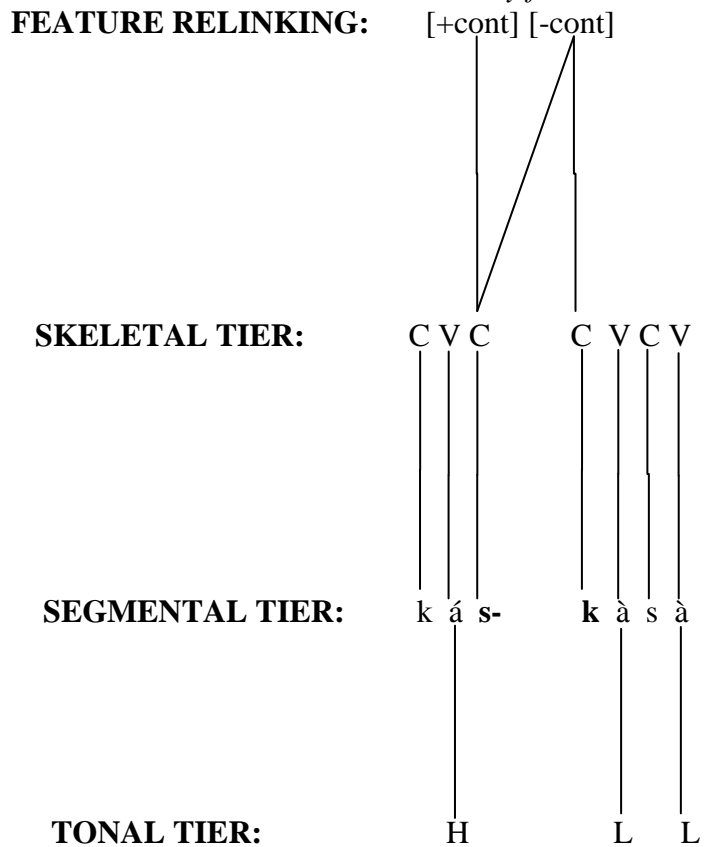
5.1c(i): **Fric+Stop Total Assimilation in Pluractional Verbs**

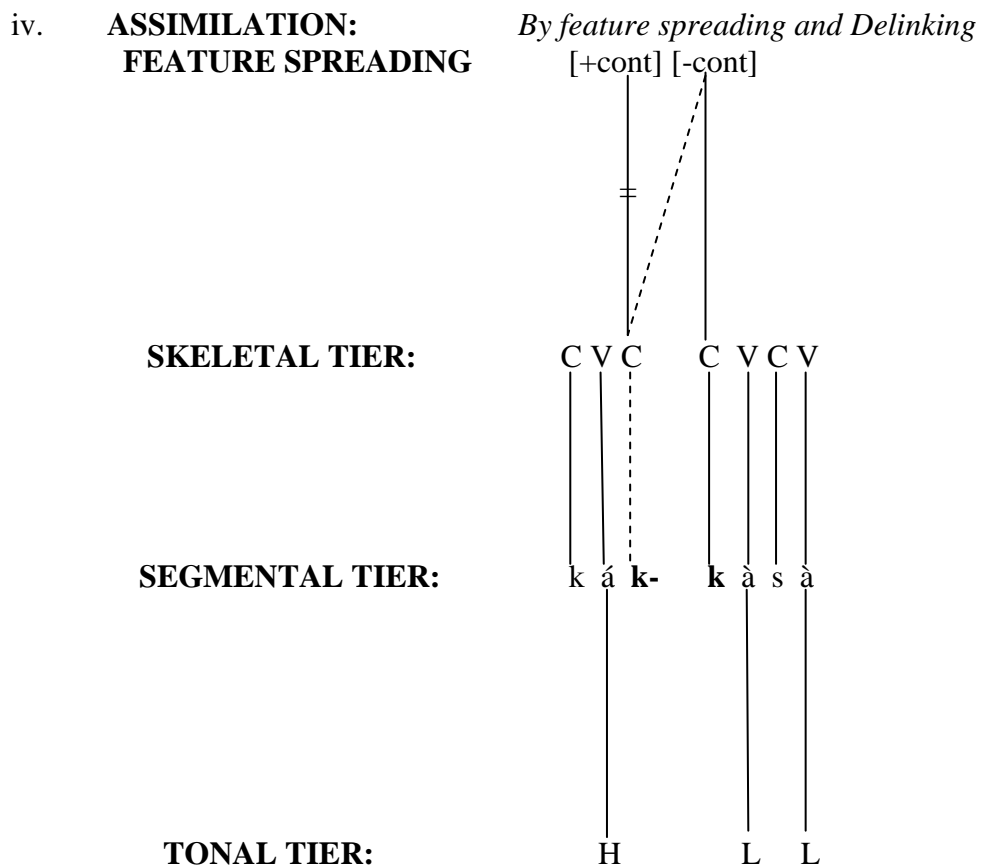


ii. **ASSOCIATION CONVENTION** *By feature Linking*



iii. **ASSOCIATION CONVENTION** *By feature Relinking*





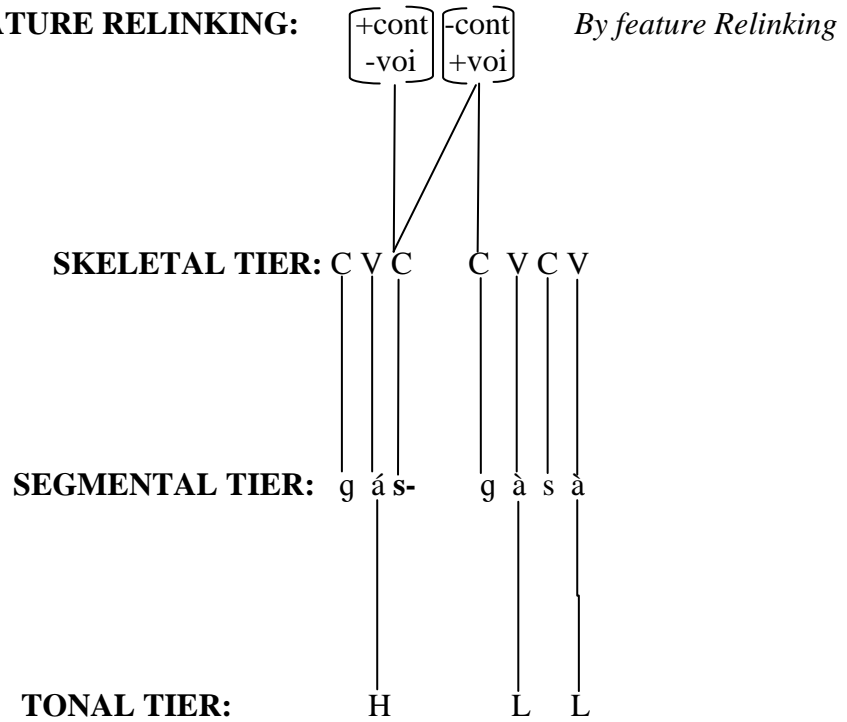
The analytic representations of the first set of data in 50(i) demonstrate a total assimilatory operation within the reduplicative formation of pluractional verbs. This process involves sequences of obstruent segments (marked by [+cont] feature) in the coda position of the reduplicated CVC, and another obstruent segment (marked by [-cont] feature) in the onset position of the root CVC. As seen in the form of Hausa pluractional verb cited in the above autosegmental analyses (5.1c), the only trigger feature that is prominent in the assimilatory operation is the *manner* feature, classified as [-cont] since the two segments in the assimilation share the same *laryngeal* feature of [-voice]. However, in a situation where the segments in sequence are varied in the *laryngeal* feature, as attested in the same set of data, the analysis differs considerably such that it captures the spreading of not only the typical *manner* feature but also *voicing* feature. This situation occurs in a simultaneous assimilatory operation in the context of reduplication that synchronically results in the formation of the Hausa pluractional verbs. This operational possibility is illustrated in the following autosegmental analytic representations:

5.1c (ii)

gàs-à → gásgàs-à → gággsà ‘to roast repeatedly’
 dàs-à → dásdàs-à → dáddsà ‘to transplant repeatedly’

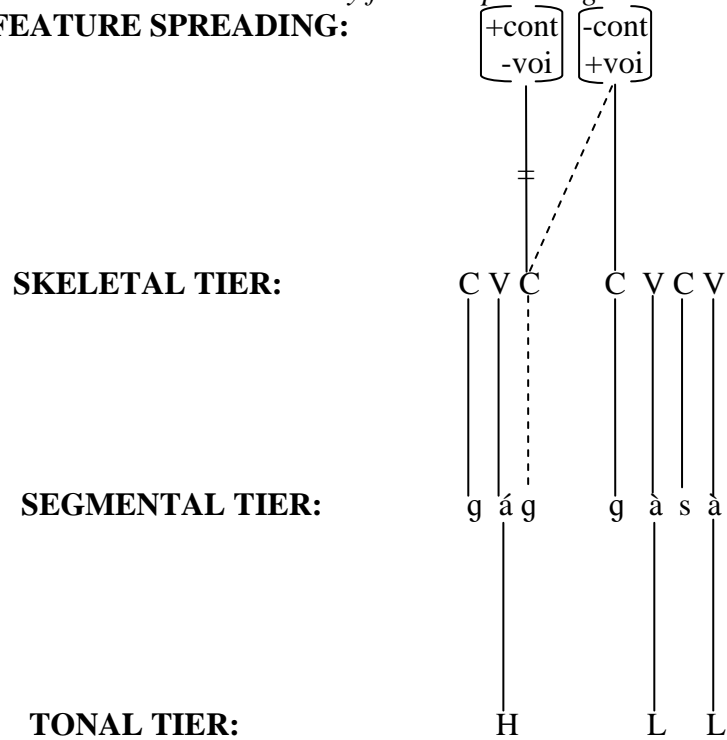
i. ASSOCIATION CONVENTION

FEATURE RELINKING:



ii. ASSIMILATION: *By feature-spreading and Delinking*

FEATURE SPREADING:

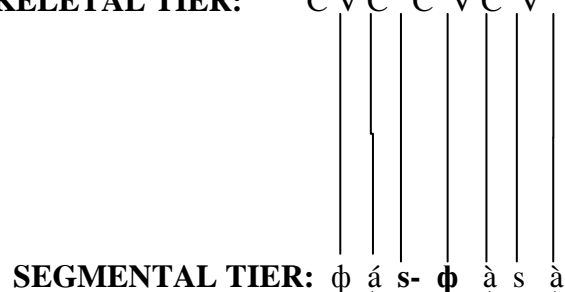


The analyses in 5.1c (ii) show multiple possibilities of simultaneous feature spreading in the context of reduplication which includes *laryngeal* ([*voice*]) and *manner* ([*cont*]) features. So, in this case, the [+*voice*] and [-*cont*] features are identified as the actual triggers that synchronically influence the target segments in the phonological operation within the context of reduplication of pluractional verbs in Hausa. In addition to this operational possibility, the second analytic representation in 5.1c (ii) equally exhibits a tendency of total segmental assimilation where sequences of *fricative-fricative* segments are involved in the assimilatory operation within the context of reduplication. But in this operation, only voiceless fricatives (*bilabial* and *alveolar*) are attested to have demonstrated such assimilatory patterns in Hausa. Similarly, since [*voice*] and [*cont*] are not considered as relevant trigger features of assimilation that basically affect the sequences of segments under discussion (in analogous with the data shown in 50i), then the assimilatory operation in respect of this data will obviously be analysed on the basis of *place* feature. This feature is considered in the current analysis as the actual trigger in the assimilatory process that results in the formation of such pluractional verbs in the language under study. Consider the following analytic representations which demonstrate the autosegmental analysis of the nature of assimilation in the context of reduplication shown in the data (50ii):

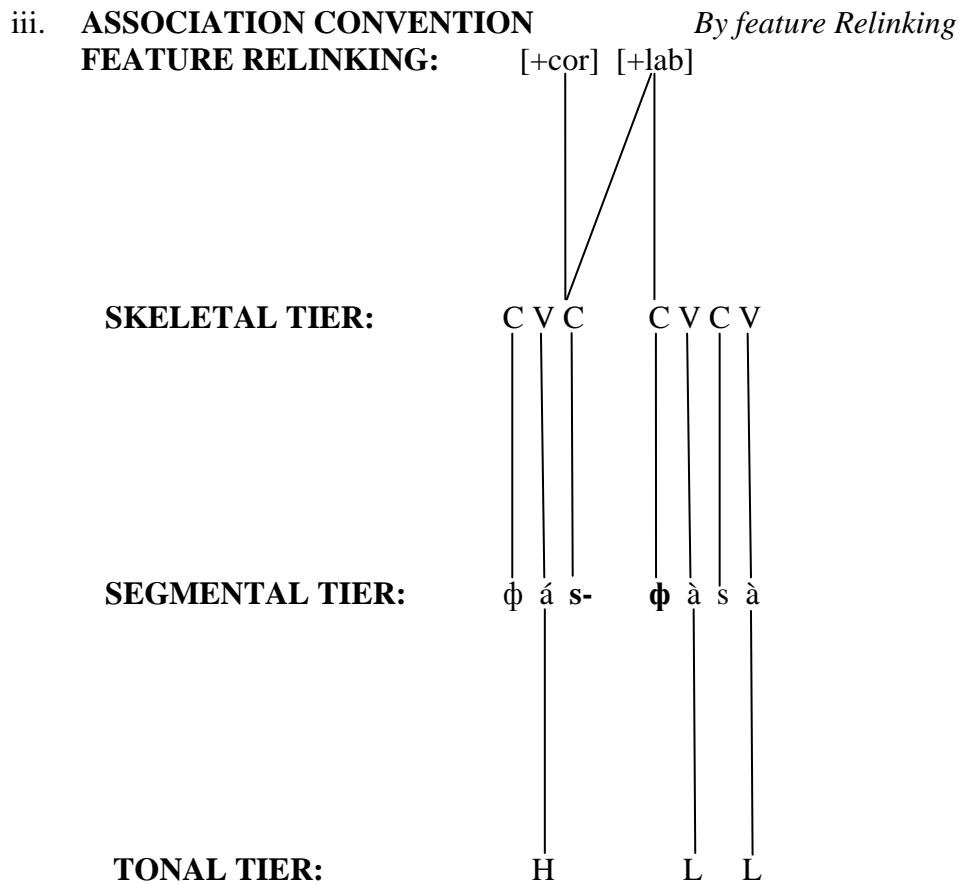
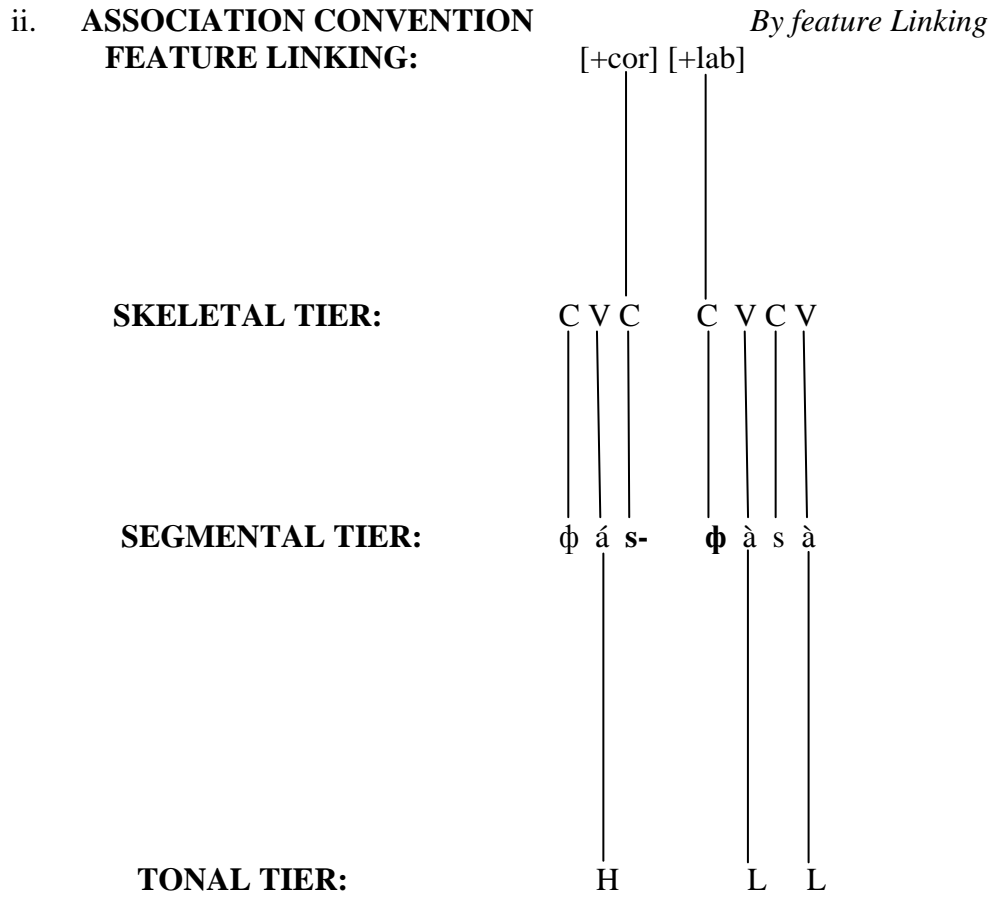
5.1d (i): **Fric+Fric Total Assimilation in Hausa Pluractional Verbs**

φàs-à → φásφàs-à → φáφφàsà ‘to break severally’
 ʃàφ-à → ʃáφʃàφ-à → ʃáʃʃàφà ‘to rub repeatedly’

i. **SKELETAL TIER:** C V C C V C V *Underlying form*

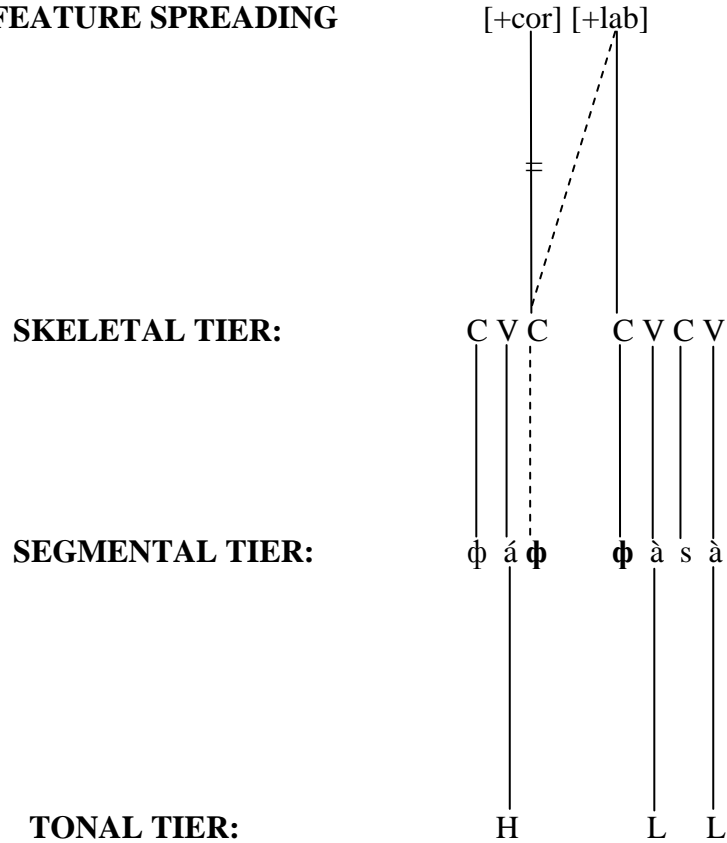


TONAL TIER: H L L



iv. **ASSIMILATION:
FEATURE SPREADING**

By feature-spreading and Delinking



Considering the analyses in 5.1d, it is very obvious that the nature of assimilation affecting the sequences of similar obstruent segments in the Hausa pluractional verbs in the data above (5.1d (i)), is best described in terms of *place* feature spreading in the manner of anticipatory assimilation. This equally implies that the *obstruent fricative* in the onset position of the root CVC is a trigger segment where it spreads its feature of *labiality* to the target *obstruent fricative* in the coda position of the reduplicated CVC in the said Hausa pluractional verbs. Therefore, as pointed out earlier, it has been established that in spite of the fact that the two segments in assimilation share the same *manner* feature, there is no doubt that the $[cont]$ feature appears to be redundant in the context of this verbal reduplicative formation. However, the same assimilatory operation analysed in 5.1d (i) can be treated in a reverse way by demonstrating the analyses of another form of pluractional verb in the set of data (50ii) being discussed. By ‘reverse way’, it means that the trigger segment is an *obstruent fricative* that contains a palatal feature, while the target segment is also an *obstruent fricative* but with a labial feature. Consider the following analytic representations:

5.1d (ii)

ʃàɸ-à → ʃáɸʃàɸ-à → ʃájʃàɸà 'to rub repeatedly'

i. ASSOCIATION CONVENTION

By feature Relinking

FEATURE RELINKING:

[+lab] [+pal]

SKELETAL TIER:

C V C C V C V

SEGMENTAL TIER:

ʃ á ɸ- ʃ à ɸ à

TONAL TIER:

H L L

ii. ASSIMILATION:

By feature-spreading and Delinking

FEATURE SPREADING:

[+lab] [+pal]

SKELETAL TIER:

C V C C V C V

SEGMENTAL TIER:

ʃ á ʃ ʃ à ɸ à

TONAL TIER:

H L L

As earlier established in the immediate preceding analysis (5.1d (i)), the pattern of assimilatory operation shown in autosegmental representations in 5.1d (ii) demonstrate a situation whereby *place* feature triggers the segmental assimilation. This phonological operation synchronically occurs within the context of partial reduplication that results in the formation of the pluractional verb under discussion. Similarly, it has been shown in the analyses that the dimension of the *place* feature spreading appeared in a reverse way, compared to those representations in 5.1d (i) where palatal feature is shown to have triggered the entire assimilatory operation therein. Meanwhile, under the current analytic operation (5.1d (i)), the *labial* ([+lab]) feature is the target feature that is associated with the *obstruent fricative* in the coda position of the reduplicated CVC within the assimilatory domain that form the said pluractional verbs in Hausa. This segment becomes synchronically influenced by the trigger palatal ([+pal]) feature of the *obstruent fricative* in the onset position of the root CVC within the context of reduplicative formation of the said pluractional verb. Similarly, the *laryngeal* feature ([voice]) appeared to be redundant in the assimilatory operation since the two adjacent obstruent segments involved in the sequence of assimilation are voiceless in nature. Also, the process of assimilation demonstrates an influence of *palatal* feature against the *labial* feature, which clearly indicates an upward shift of segmental feature (*labial* to *palatal-fricative*).

5.2.2 Total assimilation involving sequences of obstruents-sonorants in PVs

This section presents autosegmental analyses of total assimilation involving sequences of *sonorant-obstruent* segments within the reduplicative domain. This assimilatory operation usually results in the formation of the target pluractional verbs in Hausa. The analytic representations, therefore, show consistent patterns of partial reduplication of verbal morphosyntactic forms as well as the nature of phonological modifications exhibited within the context of their formation. Similarly, the *sonorant* segments appear in form of *nasals*, *approximants* and *glides*, while the analogous *obstruent* segments appear in form of *stops* and *fricatives*, accordingly.

5.2.2.1 Total assimilation involving stop/fric+nas segments in PVs

This is a sub-section of 5.2.2 which analytically discusses data on total assimilation affecting sequences of *obstruent-sonorant* segments in the reduplicative formation of Hausa pluractional morphosyntactic verbs. Here, the *obstruents* constitute

of *stops* and *fricatives* while the *sonorants* constitute of only *nasals*. In this process, the *obstruent* segments in the context of reduplication consistently occur in the coda position of the reduplicated CVC, while the *sonorant nasal* segments occur in the onset position of the root CVC. Differently put, the *obstruent* segments appear in the target domain and the *sonorant* segments appear in the trigger domain of the assimilatory operation within the context of partial reduplication that results in the formation of such pluractional verbs in Hausa. In the sets of data that follow, the *obstruent* segments involved in the assimilation belong to the class of *velar plosives* and *alveolar implosives*. And, as pointed out earlier, the *sonorant* segments in the data are *bilabial* and *alveolar nasals*. Consider the set of data that follow:

51. Underlying form	Reduplicated form	Surface form	Gloss
i. mùk-è	múkùmùk-è	múmmùkè	‘to squeeze to powdery’
mìk-è	míkmìk-è	mímmìkè	‘to sprawl out’
nìk-è	níknìk-è	nínnìkè	‘to grind severally’
nùg-è	núgnùg-è	núnnùgè	‘to weaken by beating’
màk-à	mákmàk-à	mámmàkà	‘to bang repeatedly’
mìk-à	míkmìk-à	mímmìkà	‘to give repeatedly’
nàdē	nádnàdē	nánnàdē	‘to fold repeatedly’
màk-à.là	mákmàk-à.là	mámmàkà.là	‘to past repeatedly’
ii. nàs-à	násnàs-à ⁵⁹	nánnàsà	‘to lay repeatedly’
nùf-è	núfnùf-è	núnnùfè	‘to heat with elbow’
ma:ts-à	má:tsmàts-à:	má:mmàtsà:	‘to press repeatedly’
mòts-à	mótsmòts-à	mómmòtsà	‘to stir sth repeatedly’
mats-è	mátsmàts-è	mámmàtsè	‘to squeeze repeatedly’

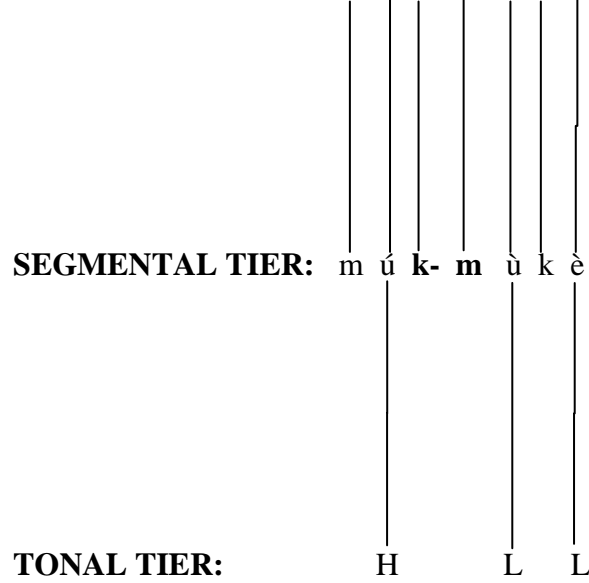
As can be seen in the data above (51), the nature of assimilatory operation is total and it affects immediate adjacent segments within the context of reduplication that usually result in the formation of such pluractional verbs in the language. The affected segments in the assimilation are obstruent stops and fricatives occurring in the coda positions of the reduplicated CVC and consistently, *bilabial* and *alveolar-nasals* in the onset positions of the root CVC, in that order. This assimilatory operation can be demonstrated in the following analytic representations where segmental features are shown to spread autosegmentally:

⁵⁹ Note that this morphosyntactic form of pluractional verb is only peculiar to *Sakkwatanci* dialect of western Hausa as well as some other dialects of Hausa in Niger Republic, particularly the one spoken at Damagaram.

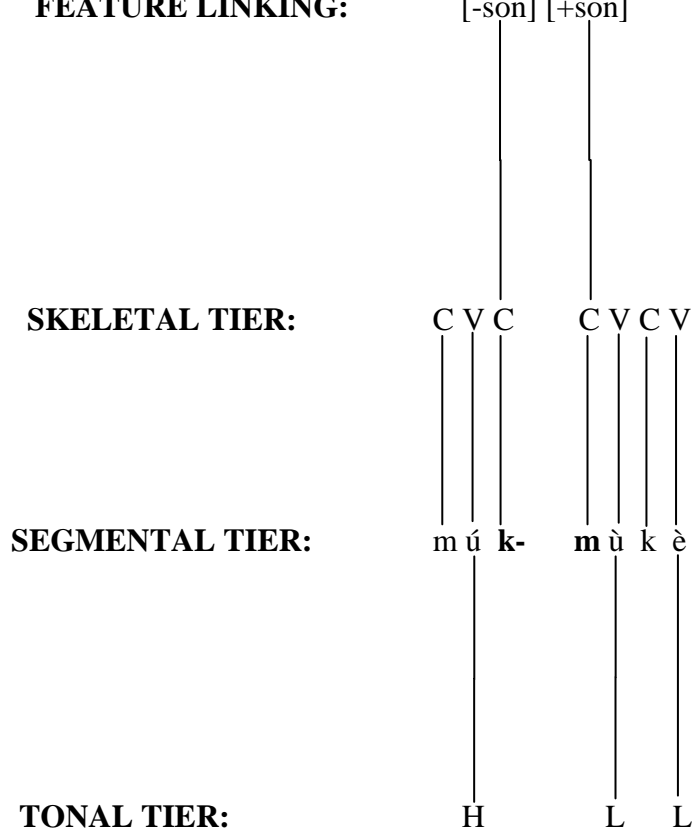
5.1e (i): **Stop+Nas Total Assimilatin in Hausa Pluractional Verbs**

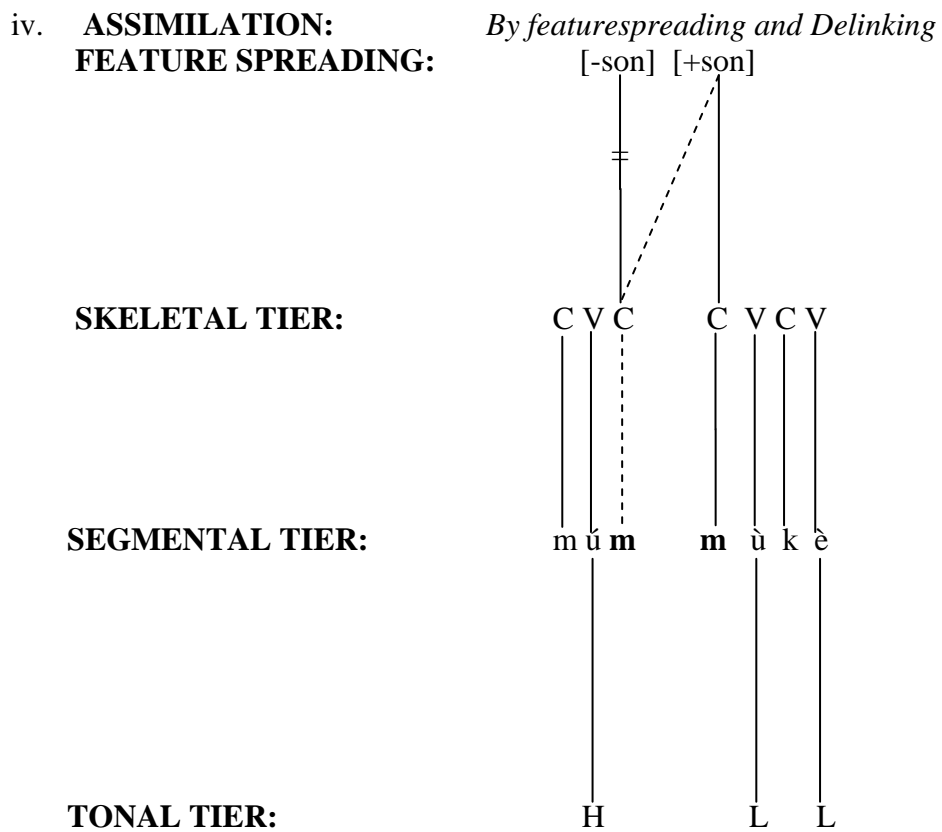
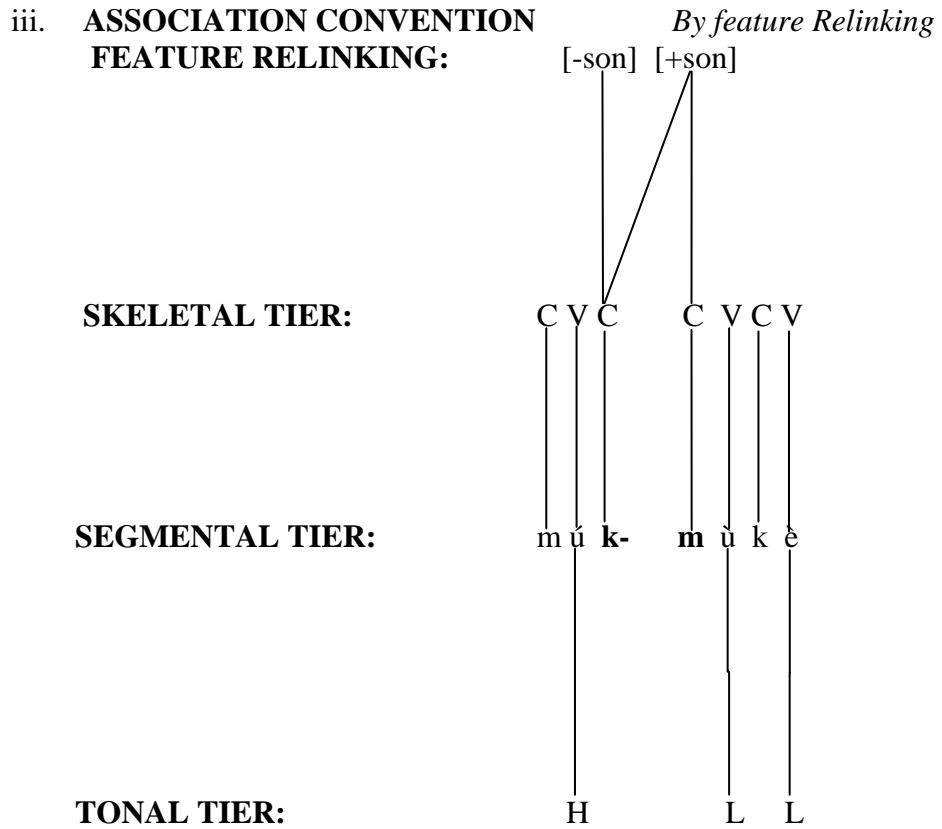
mùk-è → múkmùk-è → múmmùkè ‘to squeeze to powdery’

i. **SKELETAL TIER:** C V C C V C V *Underlying form*



ii. **ASSOCIATION CONVENTION** *By association and feature Linking*
FEATURE LINKING: [-son] [+son]





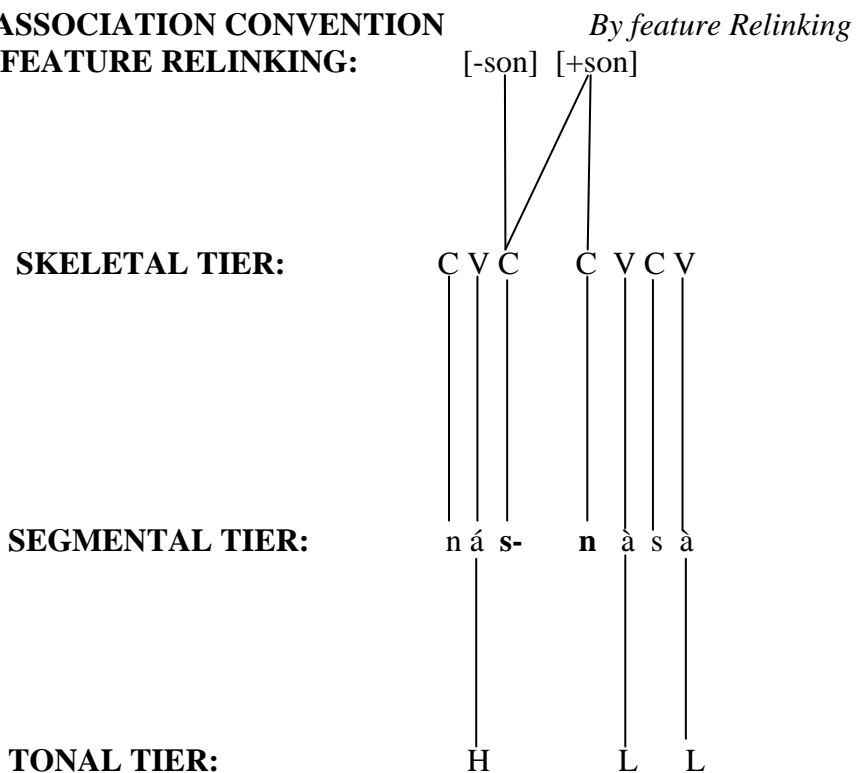
It can be seen that the autosegmental representations, as illustrated in 5.1e, exhibit certain tendency of segmental feature spreading affecting sequences of *obstruent* and *sonorant* segments in the context of reduplication of Hausa pluractional verbs. Based on the analysis, the trigger feature is associated with the onset segment of the root CVC which is [+son], while the target segment in the context of assimilation is the coda of the reduplicated CVC which is phonetically associated with [-son] feature. Similarly, it is very obvious that the same pattern of operational spreading applies to all set of data in 51(i). As demonstrated in the analyses, the [+son] of the trigger segment spreads retrogressively to influence the immediate preceding non-*sonorant* segment thereby become totally assimilated in the triggering *sonority* feature.

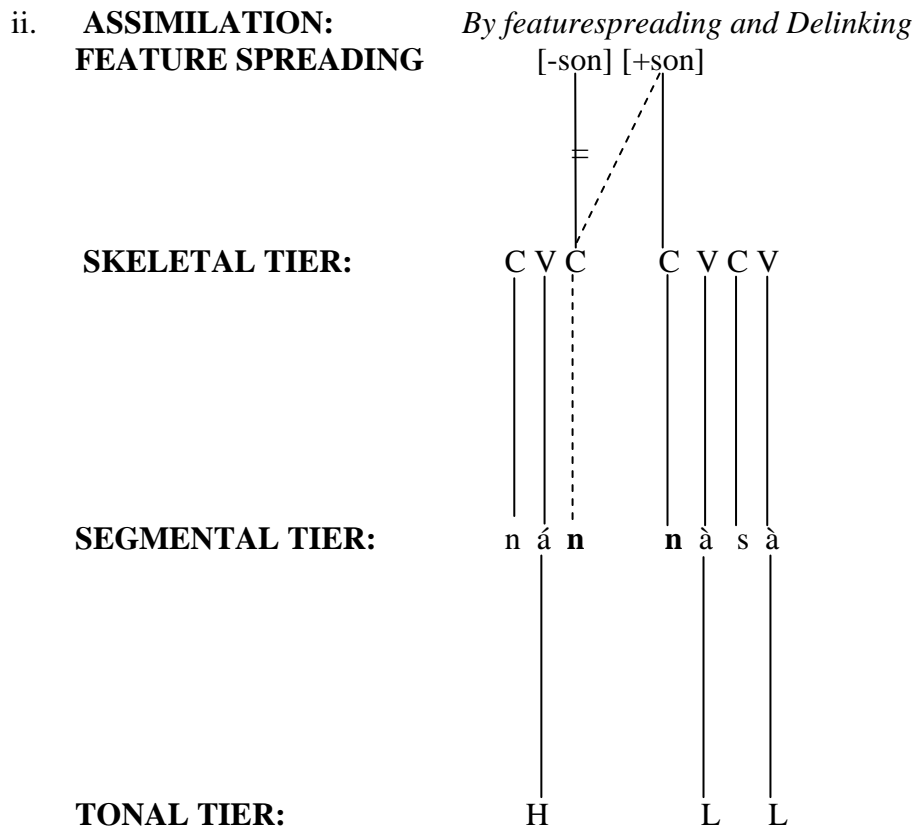
It is, however, noticed that the dimension of assimilation in the set of data in 51(ii) is obviously different as it affects sequences of *obstruent (fricatives)* and *sonorant* in the context of verbal reduplication, and in the same manner, the assimilation remain total in nature. This kind of assimilatory operation is shown in the following autosegmental analyses:

5.1e (ii): **Fric+Nas Total Assimilation in Hausa Pluractional Verbs**

nàs-à → nánàs-à → nánàsà ‘to lay something repeatedly’
 nùf-è → núnùf-è → núnùfè ‘to heat with elbow’

i. **ASSOCIATION CONVENTION
 FEATURE RELINKING:**





The autosegmental representations in 5.1e (i) and 5.1e (ii) show an obvious instance of segmental feature spreading affecting sequences of *fricative* and *nasal* segments in the context of reduplication that result in the formation of the type of Hausa pluractional verbs under study. As seen in the process, the trigger segment is associated with a [+son] feature while the target segment that becomes assimilated in that feature is associated with [-son] and is a non-continuant in nature.

5.2.2.2 Total assimilation involving stop/fric+lateral segments in PVs

This section explicates, in analytic way, the patterns of total assimilation involving sequences of *obstruent* and *sonorant* segments within the context of partial reduplication that result in the formation of pluractional verbs in Hausa. The *obstruent* segments are in form of *stops* and *fricatives* and they often appear in the coda positions of the reduplicated CVC with certain level of consistency. However, the *sonorant* segments consistently appear in form of *lateral* and central *approximants* in the onset position of the root CVC. Verb forms in the data that follow demonstrate a systematic retrogressive feature spreading indicating both trigger and target segments within the domain of assimilatory operation in the context of reduplicative formation of pluractional verbs in Hausa. Consider the sets of data below:

52.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
i.	lik-à	lí kl ik-à	lí ll ikà	‘to paste severally’
	làb-à	là bl àb-à	là ll àbà	‘to soothe’
	lùb-à	lù bl ùb-à	lù ll ùbà	‘to cover body/sth with veil’
	lèk-à	lè kl lèk-à	lè ll lèkà	‘to peep repeatedly’
	làg-è	là gl làg-è	là ll làgè	‘to curl leg repeatedly’
	rìk-è	rì kr rìk-è	rì rr rìkè	‘to hold something tightly’
	ràkà	rà kr ràk-à	rà rr ràkà	‘to escort in many times’
	ràb-à	rà br ràb-à	rà rr ràbà	‘to share to many’
	ràg-è	rà gr ràg-è	rà rr ràgè	‘to reduce bit by bit’
	rùg-á	rù gr rùg-á	rù rr rùgá	‘to run differently in group’
	rìg-è	rì gr rìg-è	rì rr rìgè	‘to remove remnants’
ii.	lí:s-à.ɸà	lí:s- lí :s-à.ɸà	lí ll í:sàɸà	‘to culculate in many’
	làɸ-tà	là ɸl àɸtà ⁶⁰	là ll àɸtà	‘to rub plenty of something’
	làs-à	là sl às-à	là ll àsà	‘to defeat opponent’
	làts-à	là tsl àts-à	là ll àtsà	‘to squash repeatedly’
	rùs-à	rù sr ùs-à	rù rr ùsà	‘to destroy repeatedly’
	ràɸ-kà	rà ɸr àɸkà	rà rr àɸkà	‘to place on top in many’
	rùts-à	rù tsr ùts-à	rù rr ùtsà	‘to put things in congestion’
	ràts-à	rà tsr àts-à	rà rr àtsà	‘to put things across’

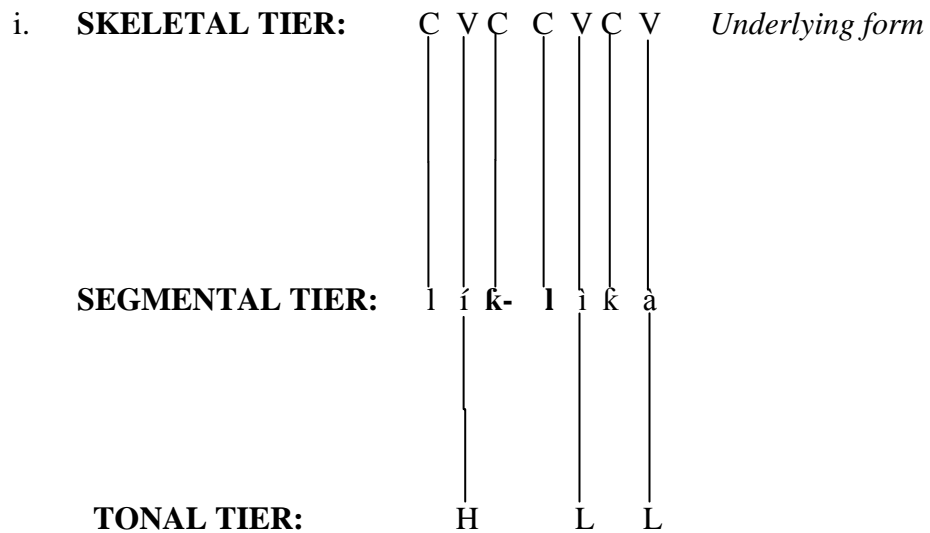
The sets of data in 52 show a consistent pattern of total assimilation affecting the sequences of *obstruent* (*fricatives*) and central or *lateral approximant* (*sonorants*) in the position of assimilatory operation within the context of the reduplicative formation of the Hausa pluractional verbs. Considering the verb forms in the data, it is obvious that in both 52(i) and 52(ii) the *obstruent* segments that appear in coda position of the reduplicated CVC are consistently *stops* and *fricatives*, respectively. Similarly, the *sonorant* segments that appear in the onset positions in the sets of data in 52(i-ii) are consistently *lateral* and central *approximants*, respectively. Beginning with the first set of data in 52, it becomes clear that the trigger segments in the assimilatory domain are basically associated with [+*son*] feature, while the target segments, conversely, contain the [-*son*] feature. Consider the following analytic representations in respect of the data:

⁶⁰ This form of pluractional verb is only common in *Sakkwatanci* dialect of Hausa, which is among the western Hausa dialects – going by the classification of Hausa dialects credited to Ahmad & Daura (1970).

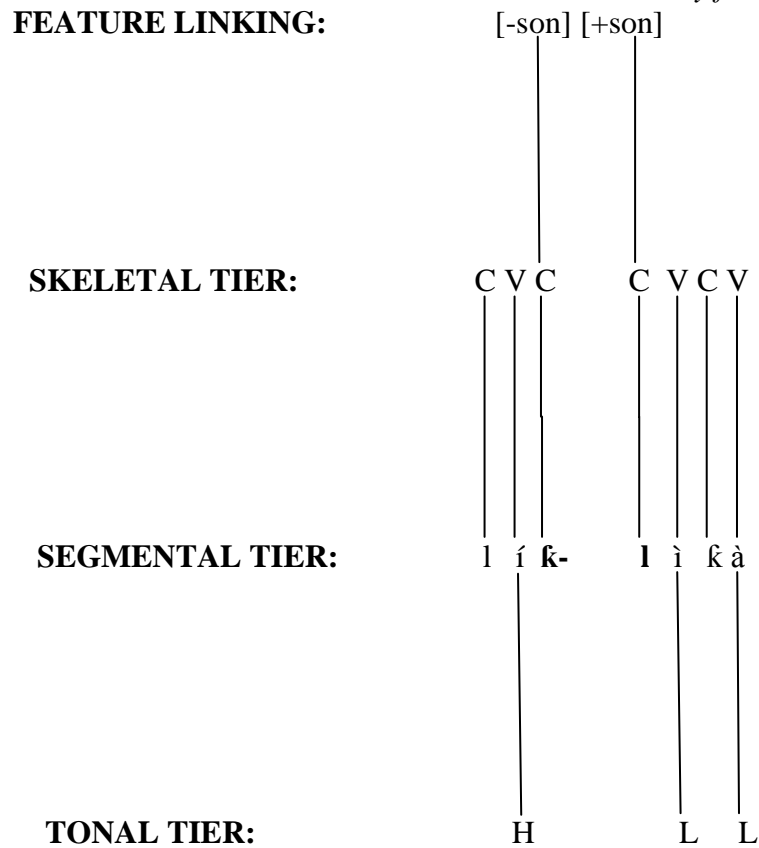
5.1f (i): **Stop+Lateral Total Assimilation in Pluractional Verbs**

lik-à → líklik-à → líllikà ‘to paste severally’

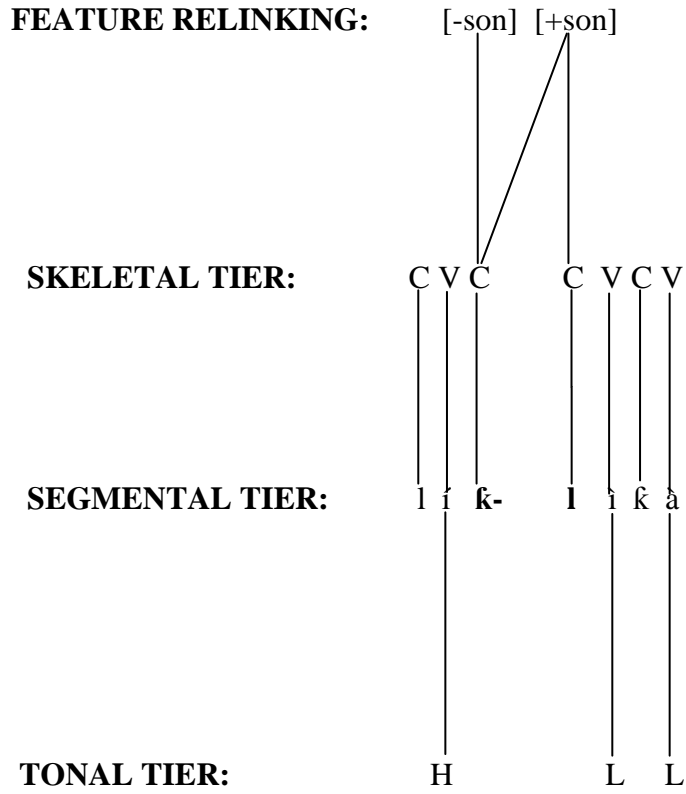
làb-à → láblàb-à → lállàbà ‘to soothe’



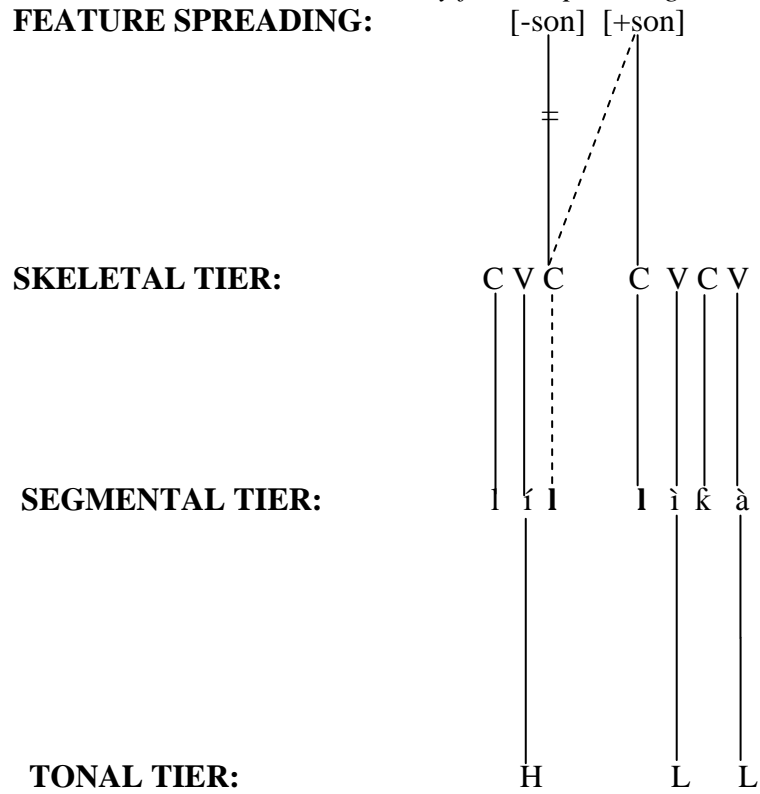
ii. **ASSOCIATION CONVENTION** *By feature linking*



iii. **ASSOCIATION CONVENTION** *By feature Relinking*



iv. **ASSIMILATION:** *By featurespreading and Delinking*



The autosegmental representations in 5.1f (i) demonstrate a total segmental assimilation which involves retrogressive feature spreading that affects adjacent segments within the domain of assimilatory operation in the context of verbal reduplication. As can be seen in the aforesaid analytic representations in 5.1f (i-iv), the two adjacent segments in the context of reduplication are underlyingly *obstruent* and *sonorant* in nature. In the same perspective, the segments that consistently occur in the onset position of the root CVC are associated with the trigger feature ([+son]). In the same way, the feature influences the target segments that occur in the coda position of the reduplicated CVC which is, conversely, associated with the [-son] feature.

At this point, it should be emphasized that the non-*continuant* feature inherently contained in the first segment (coda of the reduplicated CVC), has no relevance in triggering the assimilation in the context the target pluractional verb formation in Hausa. This is certain because the feature spreading emanates from the following segment in the sequences of the affected segments in the assimilatory domain within the context of reduplication that result in the formation of the pluractional verb forms. Similar pattern of operation, albeit with little realizational difference, is equally attested in the second set of data in 52. In these pluractional verb forms, the sequences of segments involved in the assimilation are *fricatives* (which occur in the coda position of the reduplicated CVC) and *approximants* (which occur in the onset position of the root CVC). The nature of feature spreading in the assimilatory operation in this context is similar to that attested in 52(i) and the nature of assimilation is equally total in the context of reduplication that results in the synchronic formation of this category of morphosyntactic verbs in Hausa. The analysis of this operation is illustrated in the following autosegmental representations:

5.1f (ii): Fric+Lateral Total Assimilation in Hausa Pluractional Verbs

làɸ-tà	→	láɸlàɸ-tà	→	lállàɸtà	‘to rub plenty of something’
làs-à	→	lás-làs-à	→	lállàsà	‘to defeat opponent’

i. **ASSOCIATION CONVENTION** *By feature relinking*
FEATURE RELINKING: [-son] [+son]

SKELETAL TIER:

C V C C V C C V

SEGMENTAL TIER:

l á ϕ- l à ϕ t à

TONAL TIER:

H L L

ii. **ASSIMILATION** *By feature spreading and Delinking*
FEATURE SPREADING: [-son] [+son]

SKELETAL TIER:

C V C C V C C V

SEGMENTAL TIER:

l á l l à ϕ t à

TONAL TIER:

H L L

As shown in 5.1f (i and ii), the autosegmental representations confirm the above assertion on the nature of featural spreading, where the trigger feature ([+son]) still emanates from the onset segment of the root CVC thereby influences the target

segment at the coda position of the reduplicated CVC – which is associated with an underlying [-son] feature but is *continuant* (as opposed to the other set of *obstruents* in the same category of data). As established in the preceding discussion, the [cont] feature is irrelevant in triggering the operation of assimilation affecting the sequences of segments within the context of assimilatory domain that results in the reduplicative formation of the target form of Hausa pluractional verbs.

5.2.2.3 Total assimilation involving stop/fric+glide segments in PVs

This section discusses assimilatory operation that contextually affects the sequence of *obstruent-sonorant* segments in the domain of reduplication, resulting in the formation of the form of Hausa pluractional verbs under discussion. It presents data and relevant analytic representations in respect of reduplicated verbs that involve total assimilatory transformation. Just like it was shown in the immediate preceding subsections, the *obstruent* segments constitute *stops* and *fricatives*, while the *sonorant* segments are basically in form of *velar* and *palatal-approximants* (also known as *glides*). The nature of assimilatory operation in the context of this set of data is analyzable based on retrogressive dimension of feature spreading as shown in the subsequent analyses. Similarly, it is shown that the feature of *sonority* appears as the trigger feature in the assimilatory process within the context of reduplicative formation of the said pluractional verbs in Hausa. Consider the set of data that follow⁶¹:

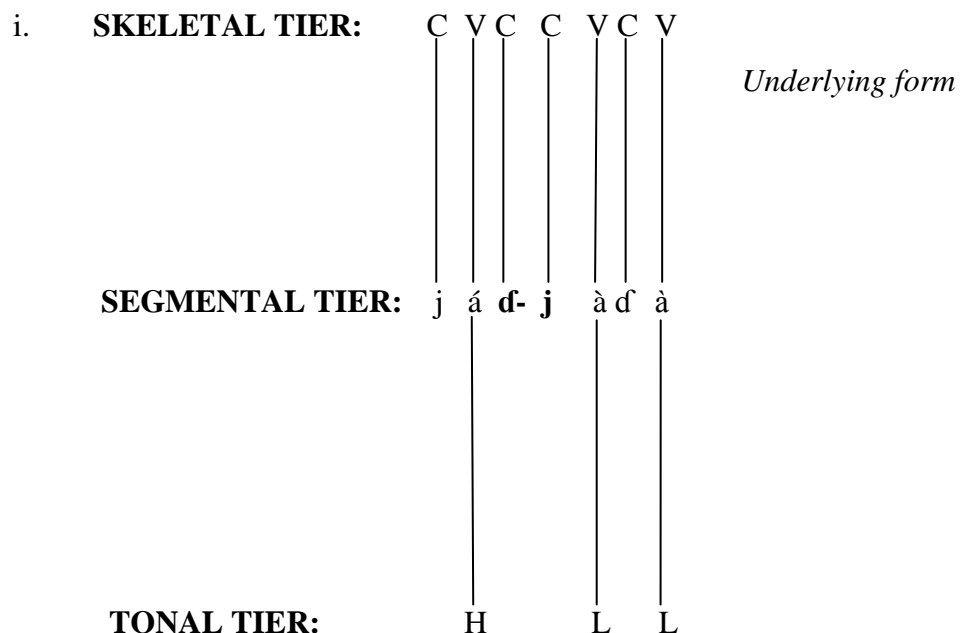
53.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
i.	jàɗ-à	jàɗjɗ-à	jàjjàɗà	‘to spread widely’
	jàg-à	jàgjàg-à	jàjjàgà	‘to tear sth multiply’
	jàk-è	jàkjàk-è	jàjjàkè	‘to defeat severally in war’
	jàb-è	jàbjàb-è	jàjjàbè	‘to plaster everywhere’
	ják-ù.tà	jàkjàk-ù.tà	jàjjàkùtà	‘to disorganize something’
	wàk-è	wàkwàk-è	wáwwàkè	‘to sing repeatedly’
ii.	jàf-è	jàffjàf-è	jàjjàfè	‘to clear well for more water’
	jàɸ-à	jàɸjɸ-à	jàjjàɸà	‘to sprinkle something’
	wàts-à	wàtswàts-à	wáwwàtsà	‘to spread information’
	wàs-à	wàswàs-à	wáwwàsà	‘to sharpen in many times’
	wàf-è	wàfwàf-è	wáwwàfè	‘to open mouth widely’

⁶¹ Note, the segment [j] as appears in both set ‘a’ and ‘b’ of data in 16 is phonetically represented. Thus, its orthographic correspondent is ‘y’, as in the word ‘yayyada’ (HLL).

The sets of data in 53 demonstrate the nature of total assimilation that involves the spreading of *sonorant* feature in the retrogressive direction thereby causing the preceding segments (*obstruents*) to become totally assimilated to the feature of the adjacent segments within the context of verbal reduplicative formation. As stated earlier, this set of data constitutes *sonorant* segments that are relatively dissimilar from the previous ones being discussed since they appeared to be *approximant* in nature, with gliding potential that naturally triggers palatalisation and labialisation in their respective operational contexts. It can as well be seen in the data that the first set (53i) involves sequences of *stop* and *approximant* (*palatal* and *velar*) segments, while the second set (53ii) involves sequences of *fricative* and same type of *approximant* segments, similar to the one in the preceding set of data data (74(i)). Despite this slight disparity, their analysis follow similar patterns with the previous analytic representations as indicated in the autosegmental representations that follow:

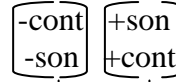
5.1g (i): **Stop+Glide Total Assimilation in Hausa Pluractional Verbs**

jàd-à → jád̥jàd-à → jájjàd̥à ‘to spread widely’



ii. **ASSOCIATION CONVENTION** *By feature linking*

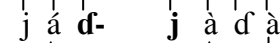
FEATURE LINKING:



SKELETAL TIER:



SEGMENTAL TIER:

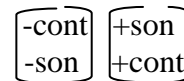


TONAL TIER:



iii. **ASSOCIATION CONVENTION** *By feature Relinking*

FEATURE RELINKING:



SKELETAL TIER:

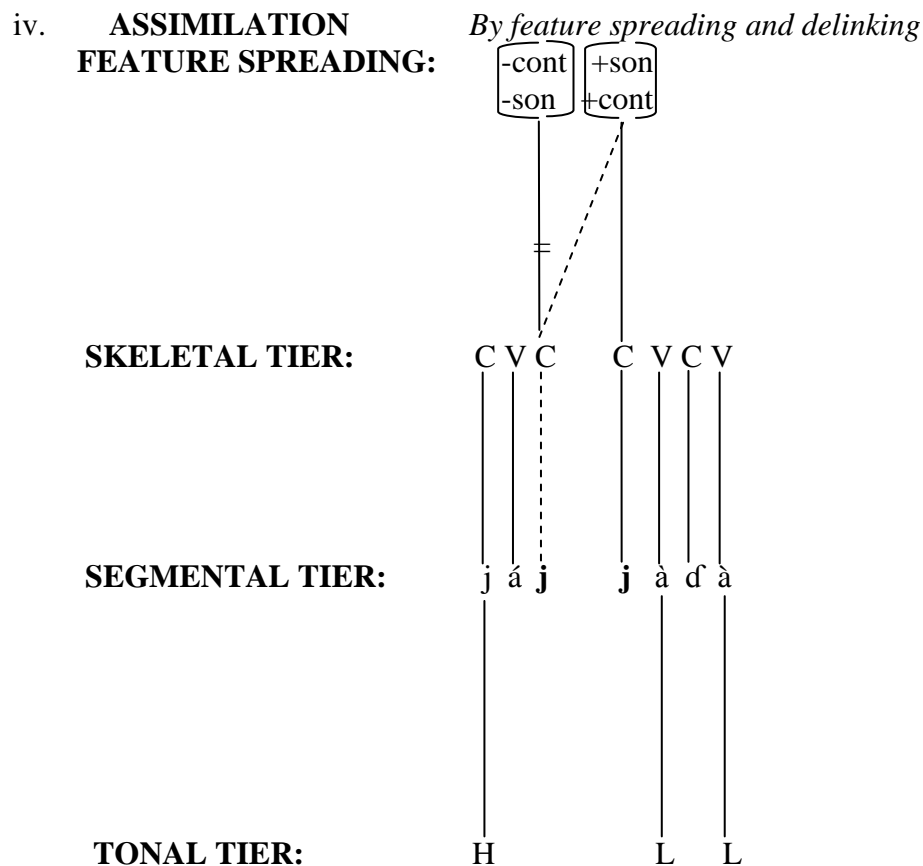


SEGMENTAL TIER:



TONAL TIER:





The autosegmental analytic representations in 5.1g demonstrate a clear instance of feature spreading which shows that in the context of reduplicative formation of this category of Hausa pluractional verbs, the segments with *sonority* feature remain the triggers of assimilation and they consistently appear in the onset position of the root CVC. The target segments, on the other hand, are not underlyingly associated with the *sonority* feature as they appear as *obstruent* segments (at underlying level) where they usually occur in the coda position of the reduplicated CVC. This, beyond any doubt, proves that the index trigger feature in this context is that of *sonority* ([*son*]), while *continuant* ([*cont*]) as a manner feature, even though appears phonetically, it remains redundant as far as assimilatory operation is concern within this contextual reduplicative formation of the target pluractional verbs in the language.

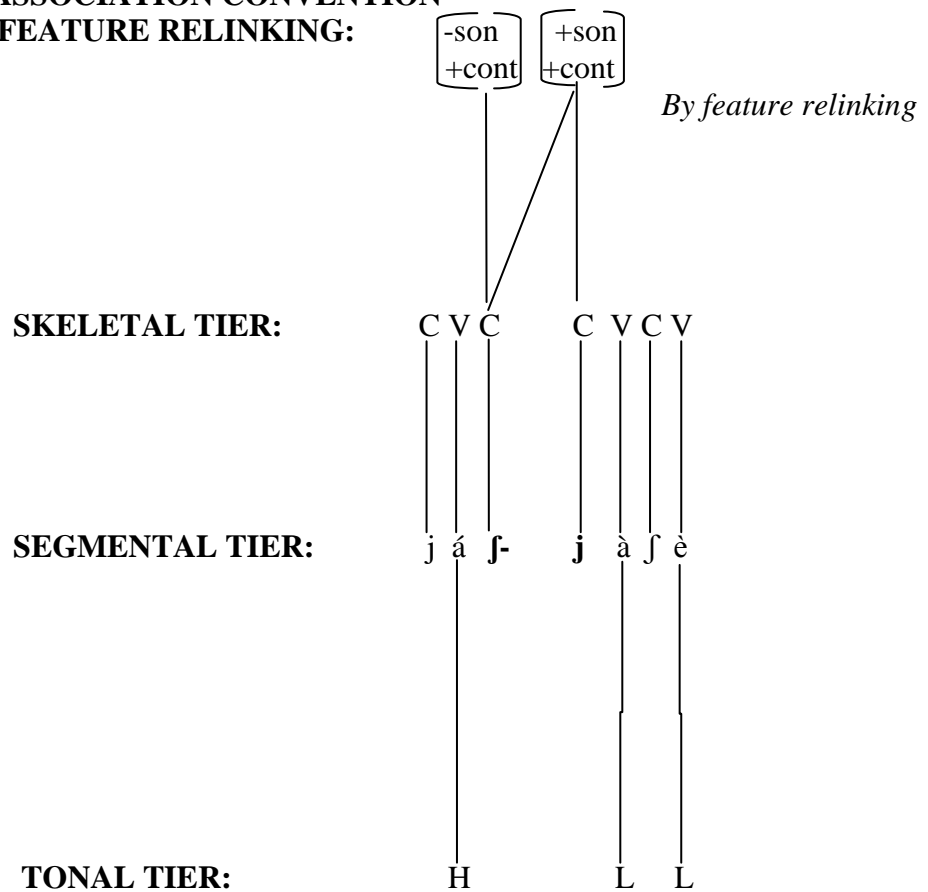
A similar situation of *obstruent* feature redundancy occurs in the subsequent set of analytic representations (5.1g (ii)), where at underlying level, they consistently appear in the coda position of the root CVC and, in turn, occupy same coda position as the root CVC becomes reduplicated. They however differ in the sense that obstruent segments in the former set of data (5.1g (i)) are non-*continuant* in nature like those in the preceding set (which are obviously *continuant*). Meanwhile, all the trigger segments in

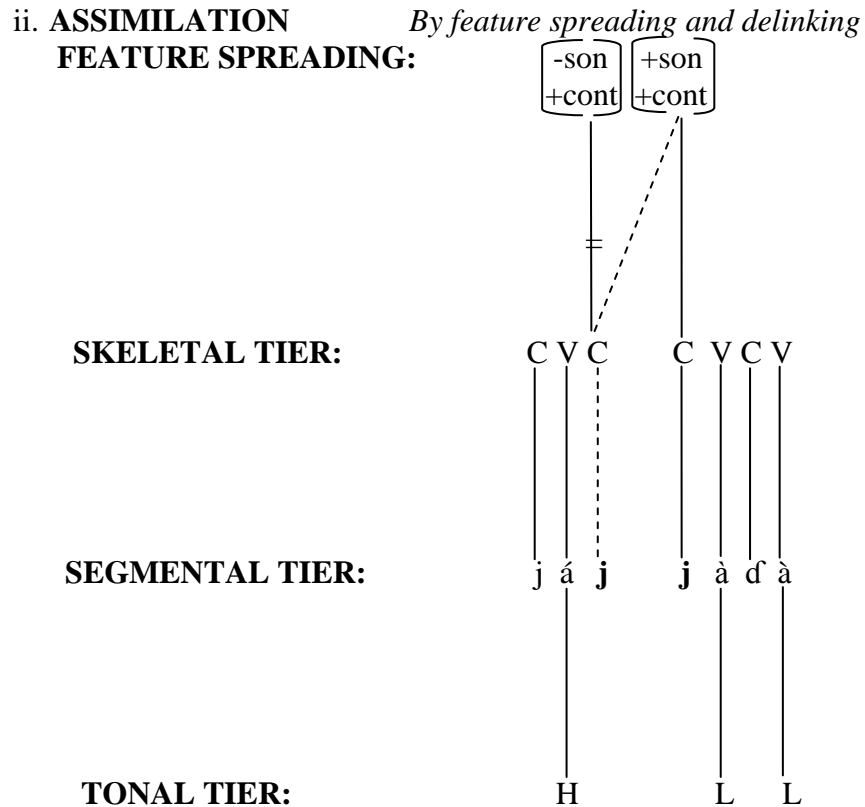
the assimilatory operation within the context of reduplication are basically associated with a feature of *sonority*, which underlyingly appear in form of *glide (approximants)*. As shown in the analysis, the *sonority* feature spreads retrogressively towards the target adjacent segments which consequently become totally assimilated in the said trigger feature. Consider the analytic representations that follow:

5.1g (ii): **Fric+Glide Total Assimilation in Hausa Pluractional Verbs**

jàf-è → jájjàf-è → jájjàfè ‘to clean out well in many times’

i. **ASSOCIATION CONVENTION
FEATURE RELINKING:**





It is very obvious that from the preceding analyses (5.1h), the actual segmental feature that triggers the assimilatory operation within the context of pluractional verb reduplicative formation in Hausa is that of *sonority* ([*son*]). This feature is not phonetically realised in the target *obstruent* segments within the context of assimilatory operation. As pointed out previously, the *continuant* feature associated with the target segments is redundant in the context of assimilation that occurs within the domain of reduplicative operation. However, the *sonority* associated with the trigger segments remains the trigger feature that spreads within the domain of assimilation which equally results in the alternation of the edge coda-onset segments of the Reduplicant and reduplicated CVCs, respectively.

5.2.3 Partial assimilation involving sonorant-obstruent segments in PVs

In the previous sections and sub-sections of this chapter, we have been analyzing the operational possibilities of feature spreading in relation to total assimilation. All the instances of assimilatory occurrence we analysed in those sections, the phonological process therein involves adjacent segments in the context of reduplicative formation of pluractional verbs in Hausa. This section, therefore, dwells on the nature of feature spreading attributed to partial assimilation in respect of reduplicative formation of Hausa pluractional verbs. Based on the available data in this

research, only limited instances of this kind of assimilation occurs which mainly involves the sequences *sonorant-obstruent* segments that occur in the domain of reduplicative operation. As stated previously, these reduplicative domains naturally form the target pluractional verbs in the Hausa language. The sets of data that follow indicate that sequences of *nasal sonorants* and *stop/fricative obstruents* are largely attested in the context of assimilation within the domain of assimilation-reduplication interface in the language. It is shown that the proportion of *nasal-stop* sequences in the contextual assimilatory operation is greater than that of *nasal-fricative* sequences in the same patterns of operation⁶². Consider the sets of data that follow:

54.	<i>Underlying form</i>	<i>Reduplicated form</i>	<i>Surface form</i>	<i>Gloss</i>
i.	bàn-tà:	bán b àn-tà:	bám b àntà:	‘to differentiate’
	kàm-à:	kám k àm-à:	káj k àmà:	‘to catch severally’
	gàm-a:	gám g àm-a:	gáj g àma:	‘to pack all’
	gùm-à:	gúm g ùm-à:	gúj g ùmà	‘to set an evil’
	dùm-à:	dúm d ùm-à:	dúj d ùmà:	‘to warm food’
	gùn-tà:	gún g ùn-tà:	gúj g ùntà:	‘to cut into pieces’
	kàm-tà	kám k àm-tà	káj k àmtà	‘to arrange sth’
	kàm-è:	kám k àm-è:	káj k àmè:	‘to dry out’
	kùm-è:	kúm k ùm-è:	kúj k ùmè:	‘to conceal’
ii.	zà:m-è:	zám z à:m-è:	zán z à:mè:	‘to slip repeatedly’
	ɸà:m-à:	ɸám ɸ à:m-à:	ɸáj ɸ à:mà:	‘to hurt again’
	tsàm-è	tsám t sàm-è	tsán t sàmè	‘to wash lightly’
	sàn-à	sán s àn-à	sán s ànà	‘to smell/sniff’

The sets of data presented in 54 show an obvious instance of partial assimilation affecting the sequences of *sonorant* (*bilabial*, *alveolar* and *velar-nasals*) and *obstruent* (*stops* and *fricatives*) segments. This process occurs within the context of reduplicative operation that results in the formation of this category of pluractional verbs in Hausa. In the case of the first set of data 54(i), the typical nature of assimilatory occurrence is consistently homorganic and it synchronically involves the spreading of *place* feature in a retrogressive direction. The occurrence of this phonological operation outrightly makes the *place* feature to potentially have the triggering effect in the contextual

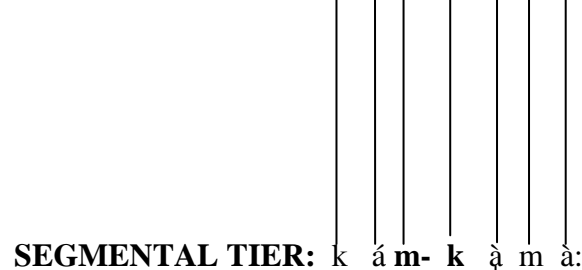
⁶² This position has also been affirmed by many scholarly works in the mainstream literature of Hausa grammar (refer to Newman 1989 and 2000 for details on this)

assimilatory operation. In the same perspective, the target segments in such reduplicative operational domains do not share same *place* feature underlyingly. Instead, they become more alike in *place* feature at the surface level which is usually resulted due to the effect of contextual assimilation involving adjacent segments. This situation is well captured in the following autosegmental analytic representations:

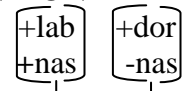
5.2a (i): **Partial Assimilation involving Nas+Stop in Hausa PVs**

kàm-à: → kámkàm-à: → káŋkàmà: ‘to catch severally’
 bànt-à: → bánbànt-à: → bámbàntà: ‘to differentiate’

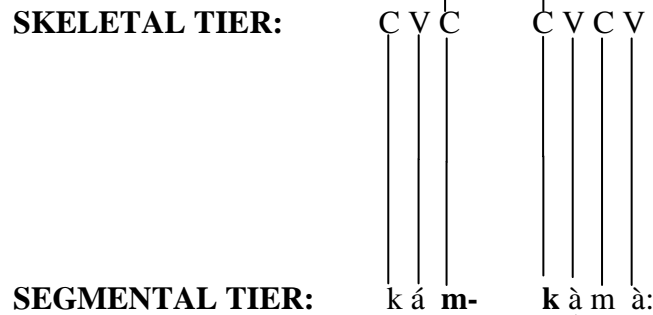
i. **SKELETAL TIER:** C V C C V C V *Underlying form*

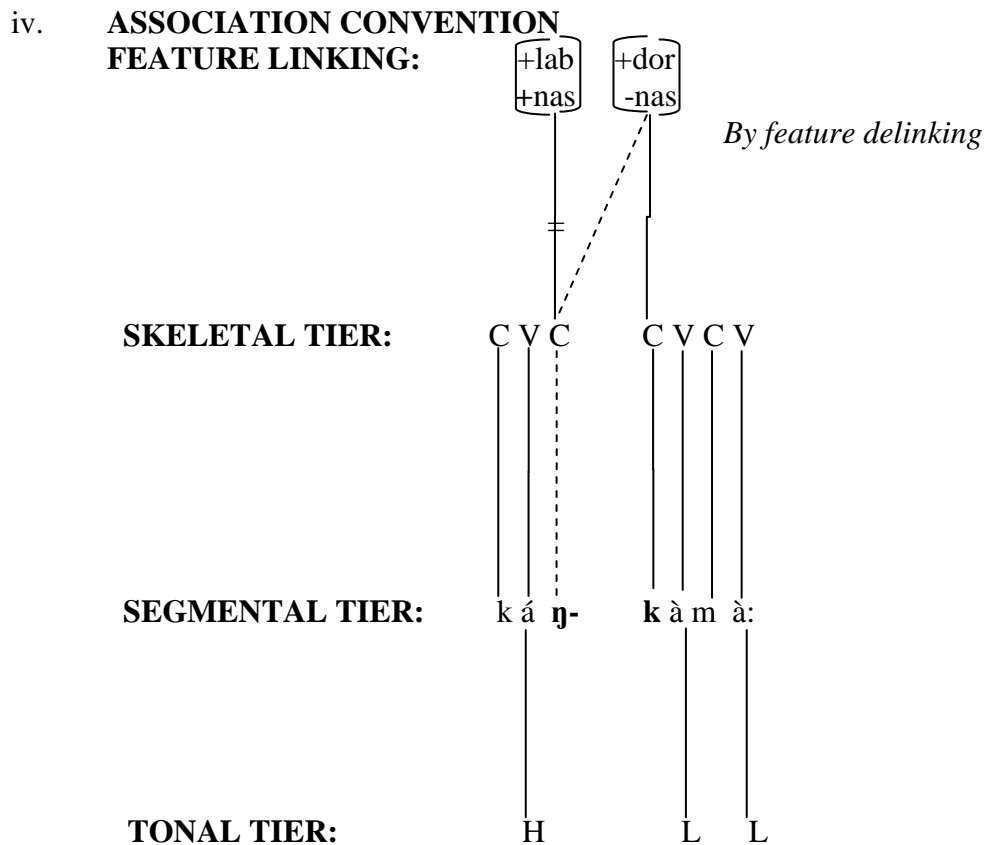
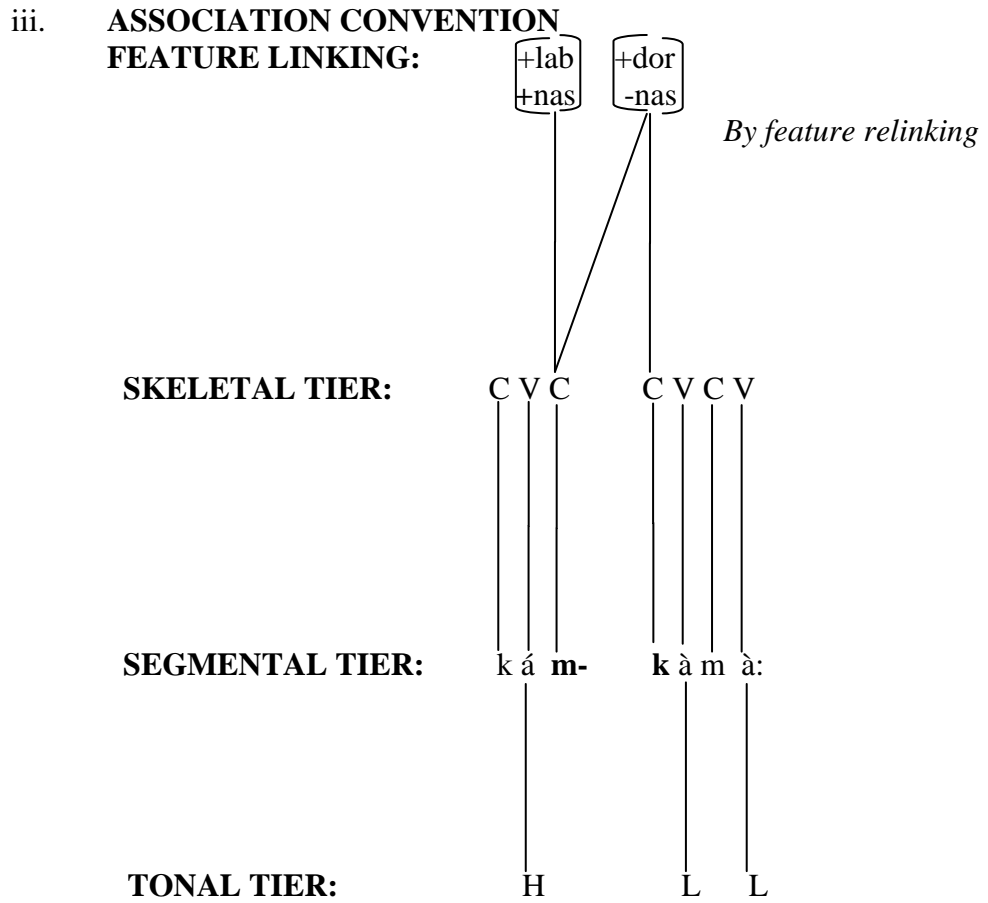


ii. **ASSOCIATION CONVENTION**
FEATURE LINKING:



By feature linking'





The analyses presented in 5.2a have obviously captured the nature of assimilatory operation occurring in the set of data above 54 (i), which clearly indicates a consistent spreading of *place* feature in a retrogressive direction. Basically, the *place* feature emanates from the onset segment of the root CVC and is identified to have triggered the assimilation of the said feature. This feature imbibed by the target segment that appears in the coda position of the reduplicated CVC element. The data in 54 and analyses that immediately follow it (5.2a) reveal that, at underlying level, the affected segments in the assimilation appear in form of a combination of adjacent *bilabial-nasal* and *velar* segments. They are, however, realized at the surface level in form of sequence of *velar-nasal* and *velar* segments, which clearly demonstrates a case of partial homorganic assimilation, as pointed out earlier.

The second set of the data under discussion 54 (ii) equally demonstrates similar patterns of assimilatory operation with that of 54 (i). However, they differ in the sense that the former involves sequences of *sonorant-stop* segments, with a shared attributes of *place* features. On the contrary, the latter involves sequences of *sonorant-fricative* segments, with a shared attributes of both *place* and *manner* features. Although the two instances of combinatory possibility in the sets of data exhibit similar tendency of *place* feature spreading - technically referred to as homorganic assimilation, the set of data in 54(ii) exhibits additional tendency of *manner* feature spreading ([±*cont*]) within the context of reduplicative formation that results in the realization or formation of this category of pluractional verbs in Hausa. For the purpose of clarity and specification, the following analytic representations (5.2a (ii)) demonstrate the actual nature of assimilatory operation that is so peculiar to the second set of data, with every other structural adjustment being equal:

5.2a (ii): **Partial Assimilation Involving Nas+Fric in Hausa PVs**

zà:mè: → zámzà:m-è: → zánzà:mè: ‘to slip repeatedly’
 φà:m-à: → fámφà:m-à: → fámφà:m-à: ‘to hurt an already wound’

i. ASSOCIATION CONVENTION

FEATURE LINKING:

[-cont] [+cont]

By feature linking

SKELETAL TIER:

C V C C V C V

SEGMENTAL TIER:

ϕ á m- ϕ à: m à:

TONAL TIER:

H L L

ii. ASSOCIATION CONVENTION

FEATURE RELINKING:

[-cont] [+cont]

By feature relinking

SKELETAL TIER:

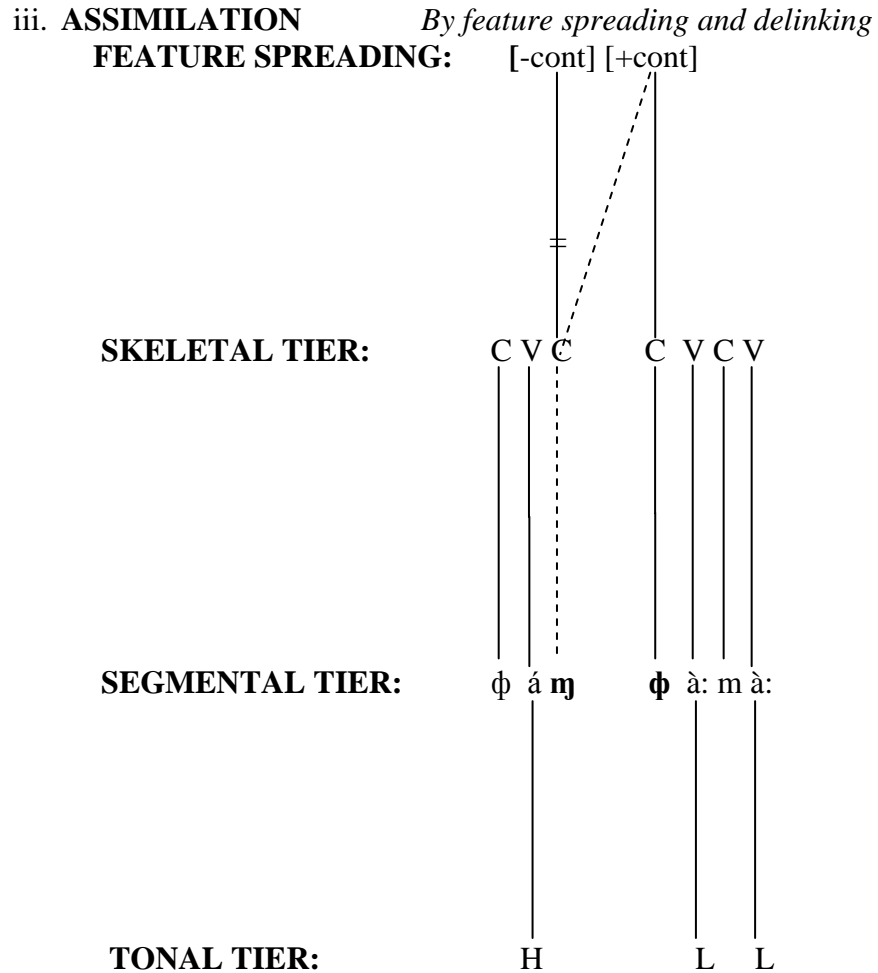
C V C C V C V

SEGMENTAL TIER:

ϕ á m- ϕ à: m à:

TONAL TIER:

H L L



As can be seen in the above autosegmental analytic representations (5.2a (ii)) of the pluractional verb forms, the nature of assimilatory operation that affects sequences of *sonorant-obstruent* segments is not the homorganic type like the one discussed in 5.2a(i). The featural change of *place* feature in the context of the current reduplicative formation of pluractional verbs is quite irrelevant in the nature of the partial assimilation that occurs within the domain of reduplication. Nevertheless, the nature of contextual assimilation in this situation is analysed on the basis of the manner feature attributed to the target coda segment of the reduplicated CVC. Therefore, based on the analyses presented in 5.2a (ii), the trigger feature in the assimilatory operation emanates from the onset of the root CVC which is a *bilabial obstruent* that is underlyingly associated with a [+cont] feature. In the same way, such [+cont] feature naturally spreads towards the target segment which is a *bilabial sonorant* that is associated with an underlying non-*continuant* feature in the preceding position. More specifically, this process of spreading occurs in the coda position of the reduplicated CVC element

within the context of reduplicative formation that synchronically results in the formation of such categories of pluractional verbs in the language.

5.3 Summary of Chapter Five

This chapter equally presents various set of data that demonstrated segmental assimilation in verbal reduplication that naturally results in the formation of Hausa pluractional verbs. The analyses show that the target morphosyntactic forms (pluractional verbs) in the language exhibit both total and partial regressive assimilatory operation involving obstruent and sonorant consonant segments. The analytic description of the nature of assimilation-reduplication interface in this category of such verb morphosyntactic forms identified some cardinal segmental features that trigger the assimilatory operation in the process of their reduplicative formation in Hausa.

CHAPTER SIX

SUMMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

This study has found that Hausa exhibits the tendency of phonology-morphology interconnectivity and is generally common to different kinds of phonology-morphology interfaces, such as phonological modifications in affixation, reduplication, compounding and clipping. However, the study discovered that the assimilation-reduplication interface in the language remains the most dominant possibility of phonology-morphology interplay. Specifically, in the reduplicative formation of nominal and verbal morphosyntactic forms, there is extensive occurrence of regressive segmental assimilation affecting both obstruent and sonorant consonants in the positions or domains of partial reduplicative operations.

Another finding in this study is that segmental assimilation occurs in the Hausa incomplete reduplicative system that usually results in the formation of ‘reduplicated nouns’ and ‘deverbalised adjectives’. These categories of Hausa morphosyntactic forms are derived through reduplication with an underlying occurrence of prefixal anticipatory assimilation involving sequences of consonant-consonant segments (in the case of reduplicated nouns) and suffixal perseverative assimilation involving sequences of consonant-vowel segments (in the case of deverbalised adjectives). In this reduplicative operation, the former segmental assimilation is attested to be both complete and incomplete assimilatory operation which involved transparent adjacent consonants that include obstruents ([b, t, d, k, g, ɸ, s, z, ʃ, dʒ]) and sonorants ([m, n, l, r, w, j]). On the other hand, the latter contextual segmental assimilation within the reduplicative domain is partial in nature and it involved the palatalization of obstruents ([t, d, s, z]) with the triggering effect of a [+high] vowel ([i, e]) in the suffixal position. In the current analytic study of these operational possibilities in Hausa, it is discovered that *labial*, *coronal (alveolar)* and *velar* place features as well as *manner ([continuant])* and *laryngeal ([voice])* features are attested as triggers of the assimilation within the reduplicative formation of reduplicated nouns in the language.

Analogously, the current study also found that similar patterns of segmental assimilation operations occur in the reduplicative formation pluractional verbs in Hausa. These reduplicated morphosyntactic verbs exhibit a tendency of assimilation in their reduplicative formation which generally occurs in the operational domain of prefixal reduplication. The nature of reduplication that results in the formation of Hausa pluractional verbs is partial and segmental assimilatory operation that usually interfaces with the reduplication is largely anticipatory in nature. This process occurs in the context of prefixal reduplication where the coda of the reduplicated-CVC appears in adjacency with the onset of the root reduplicant-CVC. Consonant segments that are involved in the total regressive assimilation in this context include sequences of *obstruent-obstruent*, *obstruent-sonorant*, *sonorant-obstruent* and *sonorant-sonorant*. Similarly, part of the findings in this study revealed that the incomplete regressive assimilation which occurs in the reduplicative formation of Hausa pluractional verbs is actually that of homorganicity, even though it appears to be very minimal. The partial assimilatory operation in this context involved only sequences of *sonorant* (*nasal, lateral, liquid* and *glides*) at the coda position of the reduplicated-CVC and *obstruent* (*stops and fricatives*) at the onset position of the root reduplicant-CVC.

In the same vein, the current study identified the affected features of the segments involved in both total and partial assimilatory operations that simultaneously occur in the reduplicative system of nominal and verbal formation. These features are categorized based on their triggering effects, nature of transparency, their contextual domains of assimilatory-reduplicative operations and the dimensions of their spreading in assimilation.

6.2 Conclusion

This study concludes that assimilation is the major phonological process that dominantly operates in Hausa reduplicative morphology, particularly in the system of partial reduplication that naturally results in the formation of reduplicated nouns and pluractional verbs. Assimilation-reduplication interface is a phenomenon that is situated within the domain of phonology-morphology interconnectivity where, in Hausa, the assimilatory operations occur concurrently with the reduplication process thereby results in the derivation of the target nominal and verbal morphosyntactic forms. In this study, the data of the target Hausa morphosyntactic forms were analysed using the theoretic model of autosegmental phonology where the nature and dimensions of

segmental assimilation in the reduplicative formation of such morphosyntactic forms were analytically explicated. In the analyses, the trigger and receptive features in the assimilatory operations were clearly identified and illustrated in the analyses. In the analysis of both nominal and verbal reduplicative formation in Hausa, it was shown that the dimensions of assimilation appeared to be in a regressive direction which impliedly indicates the dominance of backward segmental feature spreading in the reduplicative system of Hausa.

In furtherance, the current study also concludes that both total and partial assimilations are attested in all instances of reduplicative formation of the morphosyntactic reduplicated nouns and pluractional verbs in Hausa. The two types of assimilatory operations are basically edge-oriented in nature that usually affect segments of the reduplicated CVC elements and that of the reduplicant root CVC in the specific domain of reduplicative operation. As discovered in several instances of segmental assimilation in the current study, the trigger segments in the operation are consistently contextualized in the onset positions of the root CVC, while the target segments occur consistently at the coda positions of the reduplicated CVC elements.

6.3 Recommendations

The current study discovered that the previous theoretic accounts on assimilation in relation to morphological modifications in the language are substantially inadequate since they fail to determine the effects of featural ‘triggers’ and ‘targets’. And, at the same time, determine the relative tendency of transparency in the context of nominal and verbal reduplicative operation in the language under study. There is, therefore, the need for serious further research investigation on this assimilatory phenomenon in other dialects of Hausa that are not particularly represented in this study. In view of this assertion, the study recommends the following possibilities:

- i. Findings in the current research can be used to make generalizations on similar phenomenon of phonology-morphology interface in many African languages.
- ii. The theoretic orientation of the analysis in this study can be further extended to accommodate several other forms of phonology-morphology interface phenomena not covered by this study. These include, ‘assimilation-affixation’ interface and ‘assimilation-compounding’ interface in Hausa.

- iii. The study further recommends that same tools and analytic mechanisms used in handling assimilatory issues within the nominal and verbal reduplicative system of Hausa can be used to achieve same objectives in some other Nigerian languages.
- iv. The study also recommends that more recent phonological theory (such as Optimality Theory) should be used to make a comparative study on this or similar phenomenon across Nigerian languages.

6.4. Contributions to Knowledge

The current study will no doubt contribute to knowledge in many different ways considering its focal perspective. Although many scholars have conducted a lot of similar studies on this phenomenon, majority of these works concentrated largely on general issues that have to do with phonological modifications or adjustments in Hausa morphological processes. Those studies that focused on assimilatory operations in Hausa morphological process were not in-depth in terms of segmental feature specification. In view of this, the current study would add new knowledge to the existing ones since it dwelled more on the in-depth analysis of inherent segmental features in assimilation that are captured in terms of feature spreading through association. Similarly, based on the findings in this study, some segmental features have been identified as triggers and also domains of assimilation in the context of reduplication were specified. The trigger assimilatory features, the target assimilated segments and domains of transparency have all been described and captured as new knowledge in relation to the assimilatory operational possibilities in Hausa nominal and verbal reduplicative morphology.

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